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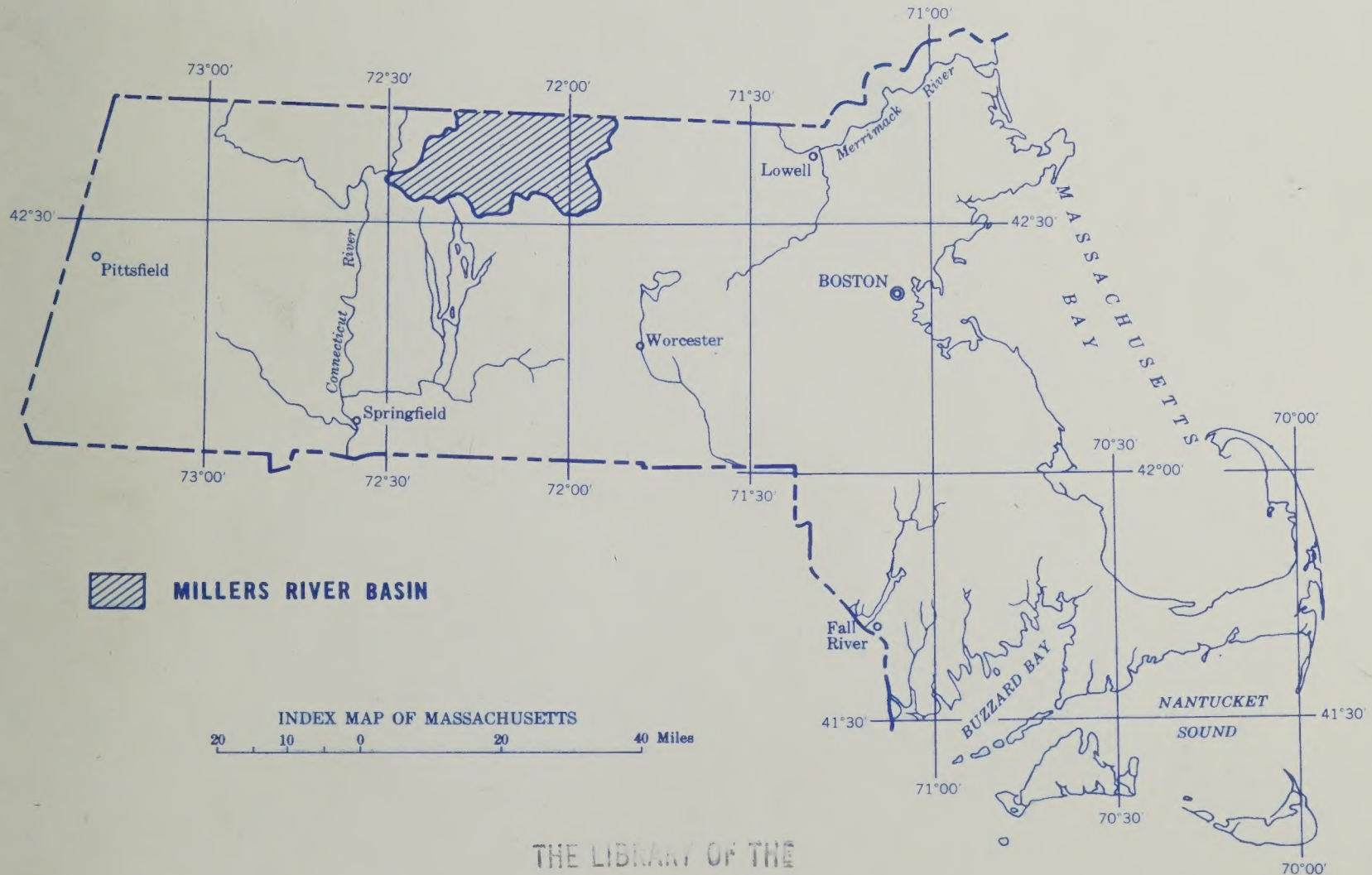
MASSACHUSETTS BASIC-DATA REPORT NO. 11
GROUND-WATER SERIES

MILLERS RIVER BASIN

By

DONALD R. WIESNET and WILLIAM B. FLECK

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UNITED STATES
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Geological Survey

MASSACHUSETTS BASIC-DATA REPORT NO. 11
GROUND-WATER SERIES

MILLERS RIVER BASIN

Records of selected wells, test holes, borings,
public water-supply systems, and chemical analyses
of water in the Millers River basin, Massachusetts

By

Donald R. Wiesnet and William B. Fleck

Prepared in cooperation with
THE MASSACHUSETTS METROPOLITAN DISTRICT COMMISSION

Boston, Massachusetts

1967

OPEN-FILE REPORT

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INTRODUCTION

The Millers River, tributary to the Connecticut River and located in Worcester and Franklin Counties, Massachusetts, and Hillsboro and Cheshire Counties, New Hampshire, drains an area of approximately 392 square miles. The Millers River basin includes the tributary Otter and Tully Rivers and all or portions of the following towns: Ashburnham, Athol, Erving, Gardner, Hubbardston, Montague, New Salem, Northfield, Orange, Petersham, Phillipston, Royalston, Templeton, Warwick, Wendell, Westminster, and Winchendon, Mass.; and Fitzwilliam, Jaffrey, New Ipswich, Richmond, Rindge, and Troy, N. H.

This report presents, in tabulated form, much of the data collected in the Massachusetts portion of the basin only during a comprehensive study of the water resources of the Millers River basin by the U. S. Geological Survey in cooperation with the Massachusetts Metropolitan District Commission. This report is released in order to make available to the public basic ground-water information that will facilitate the planning of water-resources development, and will complement an interpretive report of the area to be published at a later date.

The data in this report were collected intermittently from 1939 to 1966 by H. A. Wilde, Aarre Sinisalo, G. C. Prescott, Jr., J. A. Baker, P. F. McFarlin, W. B. Fleck, and D. R. Wiesnet. Tables 2 - 5 present selected data of those wells, test wells, and borings deemed representative of any given location. The geologic units in tables 2 and 3 are described in table 1. Tables 6, 7, and 8 include data on chemical analyses of water and precipitation samples and information regarding the major water-supply systems.

In figure 1, hydrographs of nine wells show the fluctuation of the water table with time. The locations of the wells and borings listed in tables 2-5 are shown on plate 1.

LOCATION SYSTEM

A latitude and longitude coordinate system of degrees, minutes, and seconds is used to locate wells and borings. For example, the coordinates $42^{\circ}34'46''$ north latitude and $71^{\circ}59'33''$ west longitude would be designated in the table as 423446N0715933.1. The ".1" at the end of this designation is a number assigned in the order the wells were inventoried within the area of the specified latitude and longitude.

NUMBERING SYSTEMS

Wells and test wells: These are designated by a symbol whose first term is the name of the town or city in which the well is located and whose second term is a number that is assigned in the order in which the well was inventoried within the town or city (for example: Athol 1). A separate series of numbers beginning with "1" is used within each town or city. In the tables the name of the town or city and the number are given; however, on the map, plate 1, only the number appears beside the well symbol within the designating town boundaries.

Auger borings: These are designated in the same manner as the wells with one important exception; namely, a capital "A" is included before the second term (for example: Templeton A1).

Bridge borings: These are designated, within each town or city, by the Massachusetts Department of Public Works bridge number. A few of these boring numbers include the prefix "W" as a part of the official number.

Table 1.--Geologic units and their water-bearing characteristics

Geologic unit	Thickness: (feet)	Character	Water-bearing characteristics
Alluvium	-	Chiefly sand and silt; contains gravel in some stream channels.	Does not form a distinct water-bearing unit. Where it occurs it is included with the unit that underlies it.
Swamp deposits	-	Peat and muck; some interbedded with sand and silt.	Contain large amounts of absorbed and ponded water, but may retard the vertical movement of water between the surfaces of swamps and the more permeable material underneath swamp deposits. Not utilized as an aquifer.
Outwash	0-225*	Sand, lesser amounts of gravel, silt, and clay, and scattered boulders. Generally well-stratified.	Yields small to large quantities of water to wells. Reported yields of 13 wells ranged from 2 to 273 gpm. The median yield was 22 gpm. Stores large amounts of ground water and furnishes a large portion of the water forming the base flow of the streams.
Ice-contact deposits	0-115*	Sand and gravel, with lesser amounts of silt and clay.	Yield small to large quantities of water to wells. Reported yields of 43 wells ranged from 1.5 to 720 gpm. The median yield was 31 gpm. Individual deposits may differ markedly from one another in composition, sorting, and permeability, and each must be explored to find the more permeable deposits.
Till	0-130*	Unstratified clay, silt, sand, pebbles, cobbles, and boulders.	Yields small amounts of water to wells. Because of poor sorting and a large range of particle size, permeability of till is small. Many shallow wells reportedly go dry during the summer. Till may confine water in underlying bedrock.
Bedrock	-	Chiefly igneous and metamorphic rocks.	Yields small to moderate amounts of water to wells from joints and fractures. Reported yields of 57 wells ranged from 0.7 to 152 gpm. Median yield was 7 gpm.

*Maximum values from drillers' logs.

Table 2.--Records of selected wells and test wells

Well no.	Location	Owner or user	Year completed	Altitude of land surface datum (feet)	Depth of well (feet)	Diameter of well (inches)	Principal water-bearing material	Character of water	Level	Date of measurement	Remarks
1	423458N0721548.1	Town of Athol	1946	520	-	4	s	-	52	-	-
2-5	423526N0721417.1-4	Athol Gas & Electric	1942	515	Dr	52	s	-	52	-	-
6	423220N0721530.1	Morgan Memorial	-	560	-	3	-	-	-	-	-
7	423158N0721328.1	CCC Camp	1936	780	Dr	198	-	-	130	br	-
8	423458N0721220.1	-	-	850	Du	15	-	-	-	-	-
9	423510N0721358.1	Athol Bathing Co.	-	550	Du	20	-	-	-	-	-
10	423649N0721431.1	Town of Athol	1950	520	-	28.4	g	-	28.4R	icd	-
13	423620N0721418.1	do.	1950	520	-	77.5	g,s,cl,st	-	77.5R	icd	-
14	423557N0721415.1	do.	1950	510	-	78.2	s,g	-	-	icd	-
17	423520N0721350.1	do.	1950	540	-	27.3	g,s	-	-	icd	-
18	423511N0721421.1	do.	1950	520	-	42.1	s,g	-	42.1R	icd	-
19	423442N0721510.1	do.	1950	520	-	5	g	-	5R	icd	-
20	423501N0721543.1	do.	1950	510	-	22	g,s,st	-	22R	icd	-
21	423418N0721544.1	Walter Scheck	-	580	Dr	228	-	-	70	br	-
22,23	423414N0721551.1-2	Mrs. Fred Doe	-	585	Du	<20	-	-	-	-	-
24	423419N0721537.1	Mr. Kimball	-	555	Dr,Dn	28	s,g	-	60	br	-
25	423427N0721540.1	J. F. Thompson	-	520	Dn,Du	22	s,g	-	-	-	-
27	423411N0721512.1	D. M. Prim	-	590	Du	23	-	-	18	br	-
28	423406N0721514.1	-	-	580	Du	23	-	-	80R	icd	-
29	423447N0721526.1	Town of Athol	1950	520	-	80	s,g	-	39.1R	icd	-
30	423444N0721412.1	do.	1950	560	-	39.1	s,g	-	45R	icd	-
31	423439N0721402.1	do.	1950	570	-	45	s	-	24.2R	icd	-
32	423336N0721252.1	do.	1950	-	-	24.2	g	-	-	ow	-
40	423609N0721425.1	do.	1955	515	-	74	-	-	5	-	-
41	42358N0721556.2	Mrs. M. Bourget	Pre-1860	591	Du	12.3	-	-	9.12	un	-
42	423350N0721601.1	Mr. Stange	1961	600	Du	12	-	-	7.33	un	-
43	423415N0721555.1	George Johnston	1933	580	Du	13.5	-	-	7.53	un	-
44	423429N0721555.1	Mr. Irving	-	525	-	113	-	-	-	br	-
45	423734N0721334.1	Raymond Randall	1961	590	-	100	-	-	14	br	-
46	423523N0721344.1	Athol Plastics Corp.	1962	540	Dr	37	-	-	6.5	icd	-
47	423523N0721344.2	do.	1962	540	Dr	37	-	-	6.5	icd	-

ATHOL

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Principal water-bearing material	Geologic Character	Refusal	Unit	Level	Date of measurement	Remarks
ATHOL (Continued)														
48	423523NO721344.3	Athol Plastics Corp.	1962	540	Dr	42	2.5	42R	-	icd	None	1-62	T : L. Y 5.	
49	423523NO721344.4	do.	1962	540	Dr	32	2.5	32R	-	icd	4	1-62	T : L. Y 10.	
50	423523NO721344.5	do.	1962	540	Dr	36.5	2.5	36.5R	-	icd	5.5	1-62	T : L. Y 30.	
51	423523NO721344.6	do.	1962	540	Dr	36.5	2.5	36.5R	-	icd	25	8-43	D : Y 15.	
52	423622NO721303.1	Cass Dairy	1943	735	Dr	229	2.5	75	-	br	8	-	T : L. CA. Y 60.	
53	423508NO721427.1	Town of Athol	1950	520	-	18	2.5	18R	s	icd	8	-	T : L. CA. Y 60.	
54	423609NO721425.2	do.	1959	515	Dr	67	2.5	67R	s,g	icd	10	8-59	T : L. CA. Y 720; dd 36.	
55	423609NO721425.3	do.	1959	515	Dr	72	2.5	72R	s,g	icd	4	10-59	: 8-day pumping test.	
56	423604NO721423.1	do.	1959	515	Dr	64	8	64	s,g	icd	8	8-59	T : L. CA. Y 60.	
57	423604NO721423.2	do.	1959	515	Dr	61	2.5	61R	s,g	icd	4.8	8-59	: 54-58 are selected test wells from a group of 11 in Tully Brook vicinity.	
58	423604NO721423.3	do.	1959	515	Dr	66	2.5	66R	s,g	icd	4.2	8-59	T : L. CA. Y 75. 1 of 2 test wells.	
59	423617NO721416.1	do.	1959	545	Dr	80	2.5	-	s	icd	3.5	9-59	T : L. Y 5. 1 of 2 test wells.	
60	423209NO721511.1	do.	1959	590	Dr	46	2.5	46R	s,g	icd	3	9-59	T : L. CA.	
61	423251NO721539.1	do.	1959	580	Dr	46	2.5	46R	s,g,cl	icd	2	10-59	T : L. CA. Y 686; dd 20. 8-day pumping test. 62-64 are selected from 7 test wells.	
62	423524NO721422.1	do.	1959	515	Dr	85	2.5	85R	s,st	icd	5	9-63	T : L. Y 60+. Used for phenol test.	
63	423524NO721422.2	do.	1959	515	Dr	91	2.5	91	s,g	icd	9	12-65	O : L. CA.	
64	423524NO721422.3	do.	1959	515	Dr	93	8	-	s,g	icd	8	11-65	D : Y 7.	
65	423151NO721323.1	do.	1959	780	Dr	19	2.5	19R	t(?)	t	-	-	-	
66	423524NO721422.4	do.	1963	515	Dr	72	-	-	s,g	icd	5	9-63	T : L. Y 60+. Used for phenol test.	
67	423453NO721216.1	do.	1955	850	Dr	17	-	17R	s,g,t	icd	-	-	-	
68	423336NO721248.1	do.	1955	835	Dr	25.5	-	25.5R	s,g	icd	-	-	-	
69	423517NO721426.1	do.	1963	505	Dr	63	-	-	s	icd	4.3	9-63	T : L. Y 20.	
70	423524NO721416.1	do.	1963	520	Dr	39	-	-	s,g	icd	12	9-63	-	
71	423407NO721623.1	U.S. Geol. Survey	1965	525	Dr	20.5	2	62	s	ow	9	12-65	O : L. CA.	
72	423358NO721556.1	Napoleon L. Bourget	1965	585	Dr	127	6	64	-	br	8	11-65	D : Y 7.	
ERVING														
1	423550NO722150.1	State of Massachusetts	-	550	Du	12.5	1.5	-	-	icd	7.85	5-10-39	-/N	
2	423500NO722955.1	Millers Falls Co.	-	210	Dn	72	6	-	s,g	ow	-	-	D : CA. Y 17.	
3	423455NO722957.1	do.	-	220	-	275	8	190+	-	br	-	-	- : CA. Centrifugal (suction) pump. Electric power.	
4	423559NO722357.1	Town of Erving	-	480	Du	10.4	24	-	-	-	5.39	2-2-39	PS	
5	423556NO722411.1	Erving Paper Mills Co.	-	460	Dr	163	6	12	-	br	-	-	- : Y 7.	
6	423556NO722411.2	F. W. Mears Co.	-	460	Du	8	-	-	-	-	-	-	- : CA.	
8	423535NO722642.1	Elmer Casby	-	500	Du	8	30	-	-	-	-	-	- : CA.	
9	423559NO722357.1	Town of Erving	-	480	Du	14	192	-	-	-	-	-	- : CA.	
12	423608NO722400.1	Clifford Rock	-	490	-	8	26	-	-	-	-	-	- : CA.	
13	423556NO722411.1	F. W. Mears Heel Co.	-	460	-	10	-	-	s,g	ow	-	-	D : CA.	
18	423531NO722925.1	Burt C. Abbott	1938	250	Dr	225	6	-	-	-	-	-	D,C : Y 2.5. Centrifugal (suction pump). Electric power.	
19	423512NO722920.1	Weather Heads Deluxe Cabins	1952	340	Dr	297	6	82	-	br	-	-	- : L. CA. Y 60+. Jet pump. Electric Power. Also, CA of confluence of Millers and Connecticut Rivers.	
21	423603NO722415.1	Paul Sretaka	-	540	Dr	98.5	-	-	-	-	-	-	- : Y 3-5.	

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of surface datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth to bedrock or refusal (feet)	Principal water-bearing material or character of unit	Level of water (feet)	Date of measurement	Remarks
ERVING (Continued)												
22	423601N0722409.1	Erving Paper Mills	1947	490	Dr	174	8	130+	-	45	-47	- Y 3-4.
23	423610N0722407.1	C. B. Turner	1890	590	Du	10.6	-	10	-	6.60	7-23-63	D,0 : Centrifugal (suction). : Electric power.
24	423608N0722405.1	Ralph Hall	1890	550	Du	15.7	-	-	s, g	13.80	7-23-63	D : Well reportedly goes dry : in summer.
25	423610N0722616.1	Gladys Pebbles	-	490	Du	18	-	-	s	11.46	7-23-63	D,0/N :
26	423548N0722624.1	J. LaClaire	1945	422	Du	12.5	36	-	-	11.26	7-23-63	D,0 : CA. Well reportedly goes : dry occasionally. : Centrifugal (suction) : pump. Electric power.
27	423610N0722620.1	Louis LaPoint	1954	425	Du	24.9	30	-	s	15.32	7-23-63	C, D, O :
28	423535N0722642.1	D. Black	1920	500	Du	11.7	-	-	t	6.70	7-23-63	D,0 : CA.
30	423446N0722836.1	Char Beaupre	-	450	Du	14.6	2.5	-	-	12.79	7-23-63	D,0/N : Also 114 ft. bedrock well.
32	423605N0722401.1	Edwin H. Dale	1962	485	Dr	250	6	27	-	23	10-	-62 : D : Y 1 1/2. Water soft.
33	423600N0722408.1	Ann Meehan	1963	475	Dr	200	6	49	-	29	11-	-63 : D : Y 1 1/2.
34	423628N0722350.1	John B. Johnson, Jr.	1961	635	Dr	300	6	12	-	15	10-	-61 : D : Y 1 1/2.
35	423522N0722706.1	Joseph Dymerski	1964	570	-	-	42	-	-	-	-	D : CA. Spring.
36	423531N0722648.1	Edward Pollard	1952	528	Dr	78	6	15	-	25	8-	-65 : D : CA. Y 8.
37	423535N0722536.1	Charles Wirth	1948	480	Dr	186	6	15	-	-	-	D : CA. Y 15.
38	423557N0722623.1	Clyde A. Rano	1894	425	-	-	-	-	-	-	-	D : CA. Spring. Dry 10/63 : and 10/65.
39	423602N0722634.1	Leon Bezio	-	615	-	-	-	-	-	-	-	D : CA. Spring.
40	423542N0722621.1	Edward Bezio	1950	425	Dr	200	6	100+	-	+4	8-	-65 : D : CA. Y 15.
41	423610N0722625.1	Edward Black	1925	525	-	-	-	-	-	-	-	D : CA. Spring. Water unsatis- : factory for domestic use.
42	423605N0722612.1	Reed Libby	1915	440	-	-	-	-	-	-	-	D : CA. Spring. Reportedly : goes dry.
43	423604N0722605.1	Aganora Wheelock	1909	415	Du	8	30	-	-	6	8-	-65 : D : CA.
44	423609N0722558.1	William Bacigalupo	-	412	Du	6	30	-	-	5	8-	-65 : D : CA.
45	423607N0722617.1	Richard Winship	1953	500	Dr	150	6	30	-	14	-	-53 : D : CA. Y 12.
46	423609N0722616.1	Lila Mahurin	1965	490	Dr	165	6	50	-	15	2-	-65 : D : Y 6 1/2.
47	423611N0722613.1	Frank Kersavage	1964	488	Dr	172	6	-	-	28	9-	-64 : D : CA. Y 5.
48	423629N0722429.1	Edith Formbals	1964	640	Dr	102	6	-	-	-	-	D : CA. Y 15.
49	423621N0722432.1	Harry E. Smith	1953	655	Dr	-	-	-	-	-	-	D : CA.
50	423635N0722429.1	Laura McLeod	-	690	-	-	-	-	-	-	-	D : CA. Spring.
51	423645N0722435.1	Harold Taylor	1964	725	Dr	80	6	15	-	10	-	-64 : D : CA. Y 5.
52	423652N0722411.1	Linwood Savage	1964	800	Dr	52	6	5	-	-	-	D : CA. Y 6.
53	423657N0722447.1	Ralph C. Berry	1964	840	Dr	91	6	8	-	-	-	D : CA. Y 4 1/2.
54	423725N0722456.1	Franklin Savage	1965	1090	Dr	323	6	5	-	40	6-	-65 : D : CA. Y 2 1/2.
55	423625N0722447.1	Henry Houghton	-	458	Du	-	-	-	-	-	-	D : CA.
56	423630N0722459.1	do.	-	435	-	-	-	-	-	-	-	D : CA. Spring.
GARDNER												
11	423430N0720124.1	Jack Raisanen	1910	920	Du	15	36	15R	s	12.78	5-	-65 : D : Y 4.
12	423430N0720136.1	T. Arthur Virta	1954	940	-	124	-	60	-	-	-	N : Y 4.
13	423432N0720138.1	do.	1933	940	Du	17.5	30	-	s, g	5.53	5-	-65 : D : L.
14	423352N0720101.1	Lithuanian Outing Association	1964	920	Dr	173	6	105	-	4	10-	-64 : C : Y 15.
15	423457N0715922.1	City of Gardner	1939	1105	Dn	18	2.5	18	s	-	-	T : L.
16	423451N0715821.1	do.	1939	1110	Dn	10	2.5	10	s	-	-	T : L.
17	423446N0715933.1	do.	1939	1105	Dn	19	2.5	19	t, s, g	-	-	T : L.

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of datum, (feet)	Surface of well, (feet)	Depth of well, (feet)	Principal water-bearing material	Character of refusal	Geologic unit	Level, (feet)	Date of measurement	Remarks
GARDNER (Continued)												
18	423424NO720019.1	City of Gardner	1939	1060	Dn	15	2.5	15	s	t	-	T :L.
19	423424NO720019.2	do.	1939	1060	Dn	23	2.5	23	s,cl,g	t	-	T :L.
20	423344NO720048.1	do.	1939	920	Dn	42.1	2.5	42.1	s,g,cl	icd	4	T :L. Y 21. Pumped 22 hrs.
21	423348NO720046.1	do.	1939	920	Dn	53	2.5	53	s,g,cl	-	-	T :L.
22	423258NO720014.1	do.	1939	920	Dn	26	2.5	26	s	-	-	T :L.
23	423257NO720012.1	do.	1939	920	Dn	37	2.5	37	cl,s	-	-	T :L.
24	423340NO720048.1	do.	1939	925	Dn	48.5	2.5	48.5	s,g	icd	4	T :L. Y 100; dd 1. High iron content.
25	423340NO720114.1	do.	1939	940	Dn	49.8	2.5	-	s,g	icd	-	T :L.
26	423338NO720101.1	do.	1939	950	Dn	59	2.5	-	s,g	icd	-	T :L. Y 35. Pumped 3½ hrs.
27	423329NO720059.1	do.	1940	925	Dn	54.5	2.5	-	s,g	icd	1.1	T :CA. L. Y 150; dd 3.
28	423319NO720053.1	do.	1940	930	Dn	39	2.5	-	s,g	icd	.7	T :L. Y 60.
29	423437NO720114.1	do.	1940	960	Dn	28	2.5	28	s,cl	icd	7	T :L.
30	423441NO720109.1	do.	1940	940	Dn	37.5	2.5	37.5	s,g,cl	icd?	13	T :L.
31	423441NO720135.1	do.	1940	950	Dn	16	2.5	16	cl,s,g	icd	-	T :L.
32	423455NO720159.1	do.	1940	970	Dn	10	2.5	10	s,g	icd?	-	T :L.
33	423450NO720200.1	do.	1940	940	Dn	12.5	2.5	12.5	s,g	icd	-	T :L.
34	423340NO725801.1	George Klockars	1951	1150	Dr	136	6	81	-	br	50	D :
35	423339NO725756.1	Fritz Klockars	1963	1170	Dr	175	6	95	-	br	80	D :
36	423354NO720120.1	Dr. H. C. Phillips	1964	940	Dr	116	4	65	-	br	flow	D,PS:Y 100. Iron = 15 ppm. Does not now flow.
MONTAGUE												
54	423431NO723016.1	Turners Falls Fire Dept.	1960	305	Dr	21.6	2.5	21.6R	s,g	-	dry	-60: T :L.
55	423431NO723016.2	do.	1960	305	Dr	121.4	2.5	121.4R	s,g,st	-	65	-60: T :L.
NEW SALEM												
3	423231NO721715.1	U.S. Geol. Survey	1965	555	Dr	22	2	-	s	-	10	-65: 0 :CA. L. Chicopee River basin.
NORTHFIELD												
1	423832NO724516.1	Miss E. P. Lee	1850	940	Du	23	36	-	-	-	17.04	5- -39: D/N :
ORANGE												
1	423452NO721942.1	Town of Orange	1943	520	Dr	60	18	-	s,g	ow	-	PS/N:CA. Y 170.
2	423528NO721959.1	do.	1945	495	Dr	77.5	-	77.5	s,g	ow	2	T :CA. L. Y 70. Permanent public-supply well installed, rated at 500-600 gpm. In May 1966, rated at 300-350 gpm.
5	423425NO721704.1	U.S. Geol. Survey	1957	530	Dr	20.6	1.4	-	s,g	ow	7.35	10- -57: 0 :L. Y 3.
6	423413NO721642.1	Francis Whitaker	1942	540	Dr	60	6	-	-	ow	28	D/N :Y 10. Well reportedly pumped dry in 1964.
7	423311NO721636.1	Mary Richards	1949	560	Dn	54	-	-	s,g	icd	46	-49: D :
8	423322NO721712.1	Mr. Stevens	1900	550	Du	15	24	-	-	icd	10.7	-65: D :
9	423438NO721738.1	Oscar Forslund	1930	528	Du	10	18	-	-	ow?	5.2	-65: D :High iron content.
10	424009NO723831.1	Dr. L. E. Estler	-	650	Du	10	24	-	-	t	dry	-65: D/N :

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of surface datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Bedrock or refusal (feet)	Principal water-bearing material or character	Geologic unit	Level	Date of measurement	Use	Remarks
ORANGE (Continued)														
11	423630NO721625.1	Baxter Powell	1960	610	Du	-	24	-	s	t	3.3	4-	-65	D
12	423703NO721629.1	-	-	590	Du	19	24	-	s	-	18.9	4-	-65	-/N
13	423713NO721629.1	M. Seaver	-	610	Du	16	24	-	-	icd	6.0	4-	-65	D
14	423830NO721509.1	Al Stratouridis	1962	590	Dr	350	-	30	gn	-	28	-	-62	C
15	423819NO721455.1	Lloyd Taylor	-	590	-	96	-	50	-	br	-	-	-	Y 4.
16	423828NO721417.1	Vernon Hamlett	1900	600	Du	22	-	-	-	icd	19.0	5-	-65	D
17	422836NO721510.1	Tully City Council	-	675	Du	14	42	-	s	icd	dry	5-	-65	-
18	423813NO721456.1	Club, Inc.	-	-	-	-	-	-	-	-	-	-	-	-
19	423819NO721451.1	Lester B. Preece	1958	580	Dr	148	6	77	-	br	38	-	-58	D
20	423815NO721451.1	Earle Keyes	1958	590	Dr	82	6	-	-	icd	28	8-	-58	Y 5.
21	423815NO721458.1	Earle J. Curfew	1948	585	Dr	64	6	64	s	icd	35	11-	-48	D
22	423815NO721458.1	Hubert Thompson	1956	590	Dr	86	6	-	-	icd	46	11-	-56	Y 30.
23	423820NO721459.1	June Nyren	1957	590	Dr	112	6	-	-	ow	43	1-	-57	D
24	423814NO721406.1	Jo Maroni	1948	600	-	190	2.5	67	-	br	19	5-	-48	Y 2/3.
25	423702NO721416.1	Earl Drews Project	1955	555	Dr	85-100	6	60	-	br	12	5-	-55	D
26	423356NO721936.1	Allen Ramsey	1960	615	Dr	130	6	28	-	br	15	1-	-60	Y 1.
27	423740NO721622.1	Vernon A. Cutter	1958	630	Dr	84	6	45	-	br	10	1-	-58	D
28	423740NO721622.1	Mr. Blackmer	-	720	Dr	195	-	15	-	br	flow	8-	-65	Y 12.
29	424020NO721631.1	Elmer Haskins	-	645	Du	17	-	-	-	-	15	8-	-65	D
30	423935NO721548.1	Harry M. Currier	-	675	Du	7	24	-	s,g	-	5	8-	-65	D
31	423916NO721547.1	H. J. Denno	-	600	Du	4	24	-	s,g	-	dry	8-	-65	D
32	423750NO721446.1	Bernal Coffin	-	600	Du	20	-	-	s	icd	18	8-	-65	D
33	423757NO721450.1	R. J. Rivers	1957	600	Du,Dn	40	-	-	s	icd	-	-	-	D
34	423729NO721528.1	William Taylor	1964	810	Dr	127	-	25	gn	-	-	-	-	D
35	423729NO721528.2	do.	1899	810	Du	14	27	-	-	-	9	8-	-65	D/N
36	423716NO721416.1	Beatrice Noel	1958	565	Du	16	29	16	-	-	14	8-	-65	D
37	423714NO721417.1	Charles Noel, Jr.	1940	560	Du	13	24	-	-	-	10	8-	-65	D
38	423655NO721421.1	Joe Latham	-	530	Du,Dn	36	-	-	-	-	20	8-	-65	-/N
39	423805NO721510.1	Town of Orange	1951	540	-	15	-	15	-	al	-	-	-	T
40	423803NO721510.1	do.	1951	540	-	12	-	12	-	al	-	-	-	T
41	423802NO721510.1	do.	1951	540	-	8	-	8	-	al	-	-	-	T
42	423805NO721506.1	do.	1951	545	-	29.5	-	29.5R	s,g	icd	5	4-	-51	T
43	423802NO721505.1	do.	1951	541	-	44.8	-	44.8R	s,g	icd	6	4-	-51	L. Y 60. Pumped 3 hrs.
44	423803NO721505.1	do.	1951	542	-	45.4	-	45.4R	s,g	icd	5	4-	-51	T
45	423803NO721505.2	do.	1951	541	-	44	-	-	s,g	icd	5	4-	-51	T
46	423802NO721505.2	do.	1951	541	-	26	-	26R	s,g	icd	-	-	-	L. Y 60. Pumped 4 hrs.
47	423801NO721504.1	do.	1951	538	-	18	-	18R	-	icd	-	-	-	T
48	423802NO721505.3	do.	1951	541	-	44	-	-	s,g	icd	5	4-	-51	L. Y 60. Pumped 3 hrs.
49	423803NO721505.3	do.	1951	541	-	40	-	40R	s,g	icd	5	4-	-51	L. Y 60. Pumped 3 hrs.
50	423802NO721506.1	do.	1951	540	-	30.2	-	-	s,g	icd	4	4-	-51	L. Y 45. Pumped 1.5 hrs.
51	423502NO721714.1	do.	1954	520	Dr	79	-	-	st,g	ow	-	-	-	T
52	423502NO721714.2	do.	1954	520	Dr	75	-	-	st,g	ow	-	-	-	L. CA.
53	423502NO721714.3	do.	1954	520	Dr	98	-	-	st,g,cl	ow	-	-	-	L. Y 3.
54	423502NO721714.4	do.	1954	520	Dr	59	-	-	st,cl	ow	-	-	-	T
55	423255NO721755.1	Ronald Stone	1955	610	-	106	-	-	-	-	-	-	-	-
56	423453NO721634.1	U.S. Geol. Survey	1965	559	Dr	42	2	-	s	ow	30	12-	-65	O
57	423343NO721635.1	do.	1965	540	Dr	20	2	-	s	ow	10	12-	-65	O
58	423434NO721816.1	do.	1965	550	Dr	21	2	-	s	ow	16	12-	-65	O
59	423437NO721738.1	do.	1965	530	Dr	21	2	-	s	ow	5	12-	-65	O
60	423331NO721808.1	do.	1965	540	Dr	62.5	2	62.5	cl	ow	6	12-	-65	O
61	423336NO721704.1	do.	1965	560	Dr	42	2	-	s,cl	ow	22	12-	-65	O
62	423447NO721945.1	do.	1965	525	Dr	20	2	-	s	ow	7	12-	-65	O

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Refusal (feet)	Geologic character	Principal water-bearing material	Level	Date of measurement	Use	Remarks
ORANGE (Continued)														
63	4234441NO721707.1	U.S. Geol. Survey	1965	529	Dn	23	2	-	s	ow	10	12-65	0	
64	4234441NO721707.2	do.	1965	526	Dn	23	2	-	s	ow	10	12-65	0	CA.
65	4234441NO721707.3	do.	1965	528	Dn	23	2	-	s	ow	9	12-65	0	
66	4234441NO721707.4	do.	1965	531	Dn	23	2	-	s	ow	10	12-65	0	
67	4234441NO721707.5	do.	1965	535	Dn	24	2	-	s	ow	15	12-65	0	CA. Wells 63-67 are located at Orange Airport.
68	423450NO721706.1	Gerald F. Fountain	-	512	Dr	86	-	-	-	br	-	-	PS	Y 75; dd 6. Iron=0.08 ppm. Supplies tents, trailers, and 18 cottages.
PHILLIPSTON														
1	423424NO720958.1	Town of Athol	1949	1165	-	7.5	-	7.5R	s	sw	1	-49	T	L. Deepest of 12 test holes.
2	423424NO720958.2	do.	1949	1165	-	13	-	13R	s	sw	1	-49	T	L. Deepest of 13 test holes.
3	423424NO720958.3	do.	1949	1165	-	5	-	5R	s	sw	None	-49	T	L. Deepest of 11 test holes.
6	423403NO720735.1	Francis Gemborys	-	1010	Du	11	30	-	s	icd	9	5-	D	Good water supply.
7	423424NO720843.1	Robert S. Schlicke	1958	1100	Dr	125	6	60	-	br	30	1-	-	Y 5.
8	423413NO720826.1	Ralph Ward	1957	1065	Dr	238	6	13	-	br	5	10-	C, D	Y 3/4.
9	423411NO720803.1	Ernest Amidon	1945	1050	Dr	66	6	-	-	icd	16	11-	D	Y 10.
10	423251NO720815.1	William MacEwen	1958	1130	Dr	169	2	0	-	br	41	10-	D	Y 2 1/2.
11	423255NO720803.1	Phillipston School	1948	1155	Dr	128	2	17	-	br	10	3-	PS	Y 20.
12	423259NO720757.1	Phillipston Congregational Church	1963	1165	Dr	130	6	10	-	br	-	-	PS	Y 55.
13	423329NO720756.1	Dexter Dill	1963	1150	Dr	160	2	12	-	br	16	8-	D	Y 3.
14	423353NO720801.1	Phillip Cameron	-	1040	Dr	140	6	80	-	br	-	-	D	Y 10.
15	423418NO720938.1	Phillipston Package Store	1949	1180	Dr	99	-	6	-	br	14	9-	D	Y 10.
ROYALSTON														
1	423753NO720704.1	William Thomson	1950	830	-	155	6	25	-	br	17	-50	-	Y 3 1/2.
2	424108NO721114.1	Carlton Wilcox	1964	1130	Dr	220	6	75	-	br	62	8-	D	Y 2.
3	424108NO721118.1	Parker W. Bowers	1944	1125	Dr	97	2.5	67	-	br	36	1-	D	Y 8.
4	423857NO721328.1	Ray Goland	-	730	Du	18	-	-	-	t	14	8-	D/N	Well reportedly went dry in 1964.
5	423857NO721327.1	do.	-	720	Du	16	-	-	-	t	12	8-	D/N	
6	423907NO721327.1	Mrs. Wood	1965	750	Dr	85	6	-	-	icd	20	5-	D	Y 30.
7	423851NO720726.1	Frank Gurney	1965	935	Dr	205	6	12	-	br	6	5-	D	Y 60.
TEMPLETON														
3	423717NO720431.1	U.S. Geol. Survey	1957	900	Dn	13.8	1.4	24R	s	icd	8.76	10-	0	Y 26. L.
4	423718NO720440.1	Otter River State Forest	1957	890	Dr	26	-	26R	s, g, cl	-	-	-	-	L.
5	423344NO720534.1	William Smallwood	1890	885	Du, Dn	38	36	-	-	-	10	-60	D/N	
6	423346NO720535.1	Raymond Evans	Pre-1945	880	Du	21	30	-	-	-	18	5-	D/N	
7	423351NO720539.1	Henry Hook	1865	895	Du	16	60	-	-	-	14	5-	D	
8	423259NO720055.1	Gardner Airport	-	951	Du	22	12	-	s	icd	20	5-	C	Well reportedly pumped dry in 1964 and 1965.
9	423209NO720138.1	S. K. Block Co., Inc.	1955	925	Du	14	36	-	s, g	icd	10	5-	In	Y 1000 gallons per day.
10	423403NO720150.1	Floyd Wert	-	935	Du	21	-	-	s	icd	16	12-	D/N	CA.
11	423335NO720215.1	Clifford Wilbur	-	1080	Du	17	36	-	-	-	5	5-	D/N	

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of surface of datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Principal water-bearing material or refusal	Character of unit	Level	Date of measurement	Remarks
TEMPLETON (Continued)												
12	423337N0720211.1	Joseph Conti	1923	1055	Du	12	24	-	-	4	6-65	D/N: Well reportedly has never gone dry.
13	423413N0720229.1	Bayard Morse	1953	1020	Du	19	36	icd	s	12	6-65	D
14	423413N0720229.2	do.	-	1035	Du	18	36	icd	s	17	6-65	D/N: Well reportedly went dry in 1953.
15	423409N0720246.1	Toivo Hannula	1899	1065	Du	16	36	t	t	4	6-65	D/N
16	423630N0720408.1	Hospital Cottages	1944	890	Dr	169	-	br	-	100	2-42	-N: Y 13.
17	423621N0720418.1	Pontaine Bros., Inc.	1944	885	-	151	2.5	br	-	11	12-44	I/N: Y 15.
18	423607N0720410.1	Baldwinsville Products, Inc.	1958	915	Dr	56	8	cl, s, g	cl, s, g	5	9-58	- Y 15. L. Seismic study indicates lack of large water supply.
19	423626N0720443.1	Edith F. Peabody	1948	870	Dr	77	2.5	br	-	80	8-48	D: Y 20.
20	423424N0720136.1	Sure Filling Station	1954	920	Dr	60	6	s?	-	8	5-54	C: High iron content. Y 12.
21	423412N0720119.1	City of Gardner	1952	950	Dr	115	6	-	-	12	2-52	- Y 25. High iron content; acidic.
22	423316N0720110.1	do.	1939	930	Dn	47	2.5	icd	s, cl	-	-	T: L.
23	423253N0720239.1	Roger J. Bauwens	-	1110	Dr	100	6	br	-	-	-	D: Y 25.
24	423335N0720238.1	Wilson Bus Lines	1944	1000	Dr	170	2.5	br	-	5	8-44	- Y 7.
25	423626N0720552.1	J. Geyster	1953	915	Du	14	24	icd	s, g?	13	10-65	D: Used only slightly.
26	423622N0720522.1	do.	1953	915	Du	18	24	icd	-	16	10-65	D
27	423300N0720055.1	U.S. Geol. Survey	1965	937	Dr	21	2	ow?	s	20	11-65	O: L. CA.
28	423611N0720509.1	do.	1965	840	Dr	22	2	ow	s	14	11-65	O: L. CA.
29	423415N0720200.1	Town of Templeton	1958	930	-	80	2.5	s, g	s, g	5	7-58	T: L. CA. Y 71. 1 of 7 test wells.
30	423456N0720459.1	do.	1965	845	-	32.5	2.5	icd	s, g	-	-	T: L.
31	423453N0720458.1	do.	1965	860	-	30	2.5	icd	s, g	-	-	T: L.
32	423403N0720522.1	do.	1965	860	-	29.3	2.5	icd	s, g	-	-	T: L.
33	423404N0720517.1	do.	1965	870	-	6	2.5	icd?	-	-	-	T
34	423405N0720515.1	do.	1965	850	-	19.8	2.5	icd	s	-	-	T: L.
35	423406N0720558.1	do.	1965	855	-	37.5	2.5	icd	s, g	10	11-65	T: L.
36	423456N0720508.1	do.	1965	850	-	34.8	2.5	icd	s, g	-	-	T: L.
37	423457N0720518.1	do.	1965	865	-	27.3	2.5	icd	s, g	-	-	T: L.
38	423503N0720529.1	do.	1965	865	-	11	2.5	-	-	-	-	T: L.
39	423523N0720553.1	do.	1965	930	-	38.5	2.5	icd	s, g	-	-	T: L.
40	423524N0720542.1	do.	1965	865	-	24.8	2.5	icd	s	-	-	T: L.
41	423533N0720525.1	do.	1965	840	-	19	2.5	-	-	-	-	T
42	423539N0720505.1	do.	1965	845	-	66.2	2.5	icd	s, g, cl	6	11-65	T: L. CA. Y 45.
43	423540N0720459.1	do.	1965	860	-	37.5	2.5	icd	s, g, cl	10	12-65	T: L.
44	423542N0720457.1	do.	1965	875	-	58.6	2.5	icd	s, g, cl	8	12-65	T: L.
45	423604N0720517.1	do.	1966	825	-	92.5	2.5	icd	s	2	1-66	T: L. CA. Y 5.
46	423611N0720509.1	do.	1966	840	-	95	2.5	icd, ow	s, g	17	1-66	T: L. CA. Y 20.
47	423432N0720216.1	do.	1966	940	-	80	2.5	icd	s, g	8	1-66	T: L. Y 20.
48	423546N0720519.1	do.	1966	840	-	78	2.5	icd	s	-	-	T: L.
49	423711N0720507.1	do.	1966	850	-	81	2.5	icd	s, g	-	-	T: L.
50	423721N0720514.1	do.	1966	845	-	71.5	2.5	icd	s, g, cl	18	3-66	T: L.
51	423646N0720511.1	do.	1966	845	-	78	2.5	icd	s, cl	10	3-66	T: L.
52	423557N0720534.1	do.	1966	835	-	52	2.5	icd	s, g, cl	10	3-66	T: L.
53	423546N0720514.1	do.	1966	825	-	69	2.5	icd	s	1	3-66	T: L. Y 26; dd 2.
54	423510N0720255.1	Templeton Water Dept.	1951	900	Dr	41	24	ow	s, cl, g	32	5-58	PS: L. CA. Y 273; dd 14.

Table 2.--Records of selected wells and test wells--Continued

Well no.	Location	Owner or user	Year completed	Altitude of surface of datum (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Principal water-bearing material or refusal	Character of water	Geologic unit	Level (feet)	Date of measurement	Use	Remarks
WARWICK														
1	423750N0722010.1	-	-	730	Du	14	36	-	-	-	9.4	5-	-39	D/N
2	423750N0722116.1	-	-	700	Du	10	24	-	-	-	4.8	5-	-39	D/N
3	423750N0722023.1	Henry J. Pierce	1960	645	Du	9	-	-	icd	icd	6	6-	-65	D
4	424001N0722104.1	Mr. McFunn	-	730	Du	8	36	-	-	icd	5	6-	-65	D
5	423954N0722102.1	Fred H. Johnson	-	705	Du	26	36	26R	-	icd	24	-	-64	D
6	424041N0721757.1	Art Bowers	-	980	Dr	100	6	60	-	br	-	-	-	D
7	423657N0721944.1	George Reid, Jr.	1955	645	Dr	140	2.5	32	-	br	18	10-	-55	D
8	423735N0722103.1	-	-	640	Du	10	12	-	s,g	-	10	9-	-65	D
WENDELL														
1	423441N0722303.1	Edith Hartgens	1958	935	Dr	125	-	13	-	br	-	-	-	D
2	423537N0722137.1	Myron Gibbs	1960	490	Dr	101	-	15	-	br	-	-	-	D
WESTMINSTER														
33	423217N0715748.1	Katherine Carey	-	1080	Du	17	30	-	-	-	15.5	8-	-49	D
34	423209N0715820.1	William Johnson	1949	1100	Dr	107	6	18	-	br	12.5	8-	-49	D
35	423151N0715722.1	Vance Butterfield	1947	1140	Dr	124	-	28	-	br	-	-	-	D
53	423305N0715738.1	Peter Rahaim	1948	1080	Du	14	24	-	g,cl	-	-	-	-	D
54	423302N0715726.1	do.	1949	1085	Du	11	-	-	s,g	-	1.5	8-	-49	D
WINCHENDON														
1	424029N0720528.1	-	-	850	Du	11.0	36	-	-	-	9.0	5-	-39	-/N
2	424153N0720520.1	-	-	870	Du	7.0	24	-	-	-	4.3	5-	-39	-/N
3	424239N0720507.1	-	-	890	Du	21.0	30	-	-	-	17	5-	-39	-/N
4	423917N0720044.1	Mrs. Gramolini	-	1075	Du	17.8	48	-	-	-	8	5-	-39	-/N
5	423931N0720149.1	-	-	1205	Du	14.0	36	-	-	-	5.5	5-	-39	-/N
6	424205N0720438.1	-	-	875	Du	9.0	36	-	-	-	5.8	5-	-39	-/N
7	424048N0720417.1	G. A. Chase	Pre-1930	890	Du	6.1	24	-	-	-	3.1	5-	-39	-/N
8	423848N0720617.1	-	-	850	Du	12.0	24	-	-	-	7.4	5-	-39	-/N
9	424108N0720511.1	Miss M. Snarr	-	875	Du	8.9	18	-	-	-	6.8	5-	-39	-/N
10	424024N0720316.1	Whitney	1892	1200	Du	26	132	-	-	-	1.0	5-	-39	-/N
11	423841N0720630.1	-	-	820	Du	14.2	24	-	-	-	12.7	5-	-39	-/N
12	424238N0720203.1	-	-	1195	Du	15.0	36	-	-	-	2.2	5-	-39	-/N
13	424205N0720153.1	W. B. Hart	-	1180	Du	12.3	24	-	-	-	4.0	5-	-39	0
14	424105N0720255.1	J. J. Witt	-	960	Du	8.8	36	-	-	-	4.9	5-	-39	-/N
15	424026N0720442.1	T. S. Haverty	1925	940	Du	18.6	36	-	-	-	9.2	5-	-39	D
16	424056N0720318.1	Helen Parker	Pre-1890	1000	Du	13.6	60	-	-	-	7.6	5-	-39	D
17	424215N0720144.1	W. B. Hart	Pre-1919	1210	Du	22.3	24	22.3	-	-	7.5	5-	-39	D
18	424138N0720254.1	Winchendon Furn. Co.	Pre-1890	995	Du	12.9	60	-	-	-	4.6	5-	-39	In
19	424200N0720258.1	General Box Co.	-	1040	Du	7.5	24	-	-	-	2.5	5-	-39	D
20	424026N0720109.1	Town of Winchendon	1940	980	-	47	2.5	-	s,cl	-	8.5	5-	-40	T/N:L
21	424026N0720109.2	do.	1940	980	-	54	2.5	54	s	-	3.5	5-	-40	T/N:L
22	424234N0720505.1	W. N. Smith	-	890	Du	11.5	24	-	-	-	3.2	2-	-39	D/N
23	424020N0720639.1	Herman Hanninen	-	860	Du	9.0	18	-	-	-	5.0	2-	-39	-
24	424017N0720439.1	M. W. Lucius	-	895	Du	9.4	17	-	t	-	8.0	2-	-39	D/N
26	423800N0720031.1	Mr. Buren	-	1150	Du	4.5	48	-	t	-	6.7	6-	-65	D/N
27	423859N0715942.1	Alfred Leverage	-	1045	Du	12.5	36	-	-	-	18	6-	-59	D
28	423801N0720026.1	R. H. Enright	1959	1150	Dr	130	6	74	-	br	4	2-	-62	In
29	424143N0720051.1	Ray Plastics	1962	1020	Dr	415	8	26	-	br	-	-	-	PS
30	424019N0720141.1	Winchendon School	-	1080	Dr	155	6	90	-	br	-	-	-	Y 5.
31	423749N0720508.1	U.S. Geol. Survey	1965	855	Dr	42	2	-	s,g	-	24	11-	-65	O
32	423909N0720537.1	do.	1965	845	Dr	31	2	77R	s	-	20	11-	-65	O

Table 3.--Records of selected borings

Boring no.: For explanation of boring-numbering system, see text, p. 2.
 Location: For explanation of boring-location system, see text, p. 2.
 Altitude of land-surface datum: Altitudes are interpolated from topographic maps. Datum is mean sea level.
 Type of boring: A, augered; Dn, driven.
 Depth to bedrock or refusal: An "R" appended to the depth indicates the boring was bottomed at refusal which may be bedrock, a boulder, a hard or cemented layer, or till.
 Material: For explanation of geologic units, see table 1.
 Character: cl, clay; g, gravel; gn, gneiss; s, sand; sh, schist; st, silt.
 Geologic unit: icd, ice-contact deposits; ow, outwash deposits.
 Water level: Given in feet below land surface.
 NOTE: See table 5 for logs of borings listed in table 3.

Boring no.	Location	Date	Altitude of land-surface datum (feet)	Type of boring	Depth of boring (feet)	Diameter of boring (inches)	Depth to bedrock or refusal (feet)	Material Character	Geologic unit	Water level	Remarks
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ASHBURNHAM

U.S. Geological Survey Auger Boring

A1 : 423853NO715737.1 : 11-66 : 1078 : A : 22 : 4 : 22R : s,g : icd : 12 :

Mass. Dept. Public Works Bridge Boring

15 : 423904NO715821.1 : 4-35 : 1063 : - : 18 : - : - : s,g : - : - : 1 of 37 borings.

ATHOL

Mass. Dept. Public Works Bridge Borings

13 : 423541NO721330.1 : 1-38 : 564 : - : 18 : - : - : s,g : - : 5 : 1 of 8 borings.
 16 : 423652NO721418.1 : - : 515 : - : 16 : - : 16R : s,t : - : - : 1 of 4 borings.
 17 : 423745NO721336.1 : 4-37 : 550 : - : 2 : - : 2R : s,g : - : - : 1 of 30 borings.
 18 : 423457NO721542.1 : -30 : 510 : - : 24.5 : - : 24.5R : s,g : - : 7+ : 1 of 4 borings.
 20 : 423433NO721541.1 : 2-35 : 498 : - : 38 : - : - : s,g,cl : - : +1 : 1 of 8 borings.
 21 : 423409NO721622.1 : -55 : 519 : - : 16 : - : - : s,g,t : - : 6 : In bed of river.
 23 : 423153NO721331.1 : -38 : 750 : - : 12.5 : - : 12.5R : s,g,cl : - : - : 1 of 9 borings.
 27 : 423333NO721303.1 : 6-41 : 815 : - : 4 : - : 6R : s,g : - : 1 : 1 of 4 borings.
 30 : 423347NO721629.1 : 6-54 : 526 : - : 17 : - : 17R : s,g,cl : - : 4 : 1 of 15 borings.
 31 : 423358NO721309.1 : 4-54 : 890 : - : 27 : - : 27R : s,g,cl : - : - : 1 of 5 borings.
 32 : 423414NO721206.1 : 5-54 : 888 : - : 23 : - : 23R : s,g : - : - : 1 of 12 borings.
 33 : 423354NO721558.1 : 5-54 : 598 : - : 8.6 : - : 8.6 : s,g : - : - : 1 of 16 borings.
 34 : 423349NO721454.1 : 4-54 : 607 : - : 9.5 : - : 9.5R : s,g : - : - : 1 of 18 borings.
 35 : 423404NO721245.1 : - : 831 : Dn : 19.6 : - : - : Peat,muck : - : Swamp : 1 of 14 borings.
 35 : 423404NO721245.1 : - : 831 : Dn : 19.6 : - : - : Peat,muck : - : Swamp : 1 of 9 punchings.

ERVING

Mass. Dept. Public Works Bridge Borings

2 : 423450NO722945.1 : 11-57 : 226 : - : 22 : - : - : s,g : - : +4 : 1 of 17 borings.
 5 : 423444NO722928.1 : -36 : 245 : - : 10.5 : - : 10.5R : s,g : - : - : 1 of 8 borings.
 13 : 423521NO722926.1 : - : 266 : - : 15.4 : - : 15.4 : s,g : - : - : Do.
 16 : 423504NO722921.1 : - : 313 : - : 21.5 : - : 21.5 : g,s : - : - : 1 of 4 borings.

GARDNER

Mass. Dept. Public Works Bridge Borings

W1 : 423358NO715933.1 : 4-61 : 1024 : - : 12 : - : 4 : gn : - : - : 1 of 5 borings.
 W2 : 423358NO715927.1 : 4-61 : 1010 : - : 26.5 : - : 26.5R : s,g,cl : - : 0 : 1 of 2 borings.
 W3 : 423353NO715855.1 : 4-61 : 1036 : - : 16.5 : - : 8.5 : s,g,sh : - : None : 1 of 4 borings.
 W4 : 423348NO715855.1 : 4-61 : 1025 : - : 9.5 : - : 9.5R : s,g : - : 1.5 : 1 of 4 borings.
 W5 : 423409NO715937.1 : 4-61 : 1026 : - : 8 : - : 8R : s,g : - : None : 1 of 6 borings.
 W6 : 423407NO715935.1 : 4-61 : 1004 : - : 14.5 : - : 14.5R : s,g : - : 5 : 1 of 6 borings.
 1 : 423426NO720100.1 : 4-63 : 918 : - : 29 : - : - : s,g,st : - : 6 : 1 of 5 borings.
 29 : 423339NO715852.1 : 11-52 : 1020 : - : 22 : - : 22R : s : - : - : 1 of 4 borings.
 30 : 423350NO715852.1 : 11-52 : 1022 : - : 24 : - : 24R : s,cl,g : - : - : 1 of 3 borings.
 31 : 423349NO715846.1 : 3-61 : 1046 : - : 19.5 : - : 19.5R : s,g : - : None : 1 of 16 borings.
 32 : 423352NO715847.1 : 2-61 : 1023 : - : 24 : - : - : s,g,cl : - : 1.5 : 1 of 17 borings.
 33 : 423352NO715843.1 : 3-61 : 1048 : - : 27 : - : 27R : s,g : - : 17 : 1 of 10 borings.
 34 : 423358NO715902.1 : 3-61 : 1041 : - : 11 : - : 11R : s : - : 3 : 1 of 15 borings.
 35 : 423357NO715933.1 : 3-61 : 991 : - : 25 : - : 25R : s,g,cl : - : 7 : 1 of 16 borings.
 36 : 423357NO715942.1 : 3-61 : 982 : - : 20 : - : 20R : s,cl : - : .5 : 1 of 18 borings.
 37 : 423403NO715936.1 : 3-61 : 1014 : - : 31 : - : 31R : s,g : - : 17 : Do.
 38 : 423342NO715722.1 : 5-61 : 1075 : - : 38 : - : 38R : s,g : - : +1 : 1 of 14 borings.
 39 : 423353NO715849.1 : 4-61 : 1024 : - : 23 : - : 23R : s,g,cl : - : 2 : In swamp.
 40 : 423355NO715843.1 : 5-61 : 1028 : - : 14 : - : 14R : s,g,t : - : .5 : 1 of 4 borings.
 40 : 423355NO715843.1 : 5-61 : 1028 : - : 14 : - : 14R : s,g,t : - : .5 : 1 of 7 borings.

Table 3.--Records of selected borings--Continued

Boring no.	Location	Date	Altitude of land-surface datum (feet)	Type of boring	Depth of boring (feet)	Diameter of boring (inches)	bedrock or refusal (feet)	Material Character:Geologic unit	Water level	Remarks
HUBBARDSTON										
U.S. Geological Survey Auger Boring										
A1	423124NO720036.1	11-66	1000	A	80	4	80	s,g	icd	15
MONTAGUE										
Mass. Dept. Public Works Bridge Boring										
6	423353NO722953.1	4-35	322	-	32.5	-	32.5R	s,g	-	1 of 25 borings.
NEW SALEM										
U.S. Geological Survey Auger Boring										
A1	423234NO721727.1	11-66	555	A	117	4	117	s,g,st,cl	ow	10
										Iron = 0.8; specific conductance = 70.
ORANGE										
U.S. Geological Survey Auger Boring										
A1	423545NO721959.1	11-65	560	A	7	4	7R	fill	-	-
A2	423556NO722027.1	11-65	500	A	13.5	4	13.5R	s	-	-
A3	423853NO721536.1	11-65	565	A	79	4	79R	s,g	icd	20
A4	423334NO721914.1	11-66	600	A	59	4	59R	s,g,st,cl	ow	22
A5	423444NO721658.1	11-66	519	A	102	4	102R	s,g,st	ow	16
Mass. Dept. Public Works Bridge Borings										
9	423554NO722031.1	8-36	485	-	18.5	-	18.5	s,g	-	1 of 18 borings.
12	423611NO722010.1	-37	545	-	17	-	17R	s,g	-	1 of 4 borings.
21	423334NO721709.1	8-54	560	-	93	-	-	s,st,cl	-	22
22	423329NO721806.1	7-54	540	-	46	-	46R	s,st	-	5
23	423423NO721922.1	12-55	604	-	17	-	17R	s,g	-	5
24	423530NO722009.1	10-56	531	-	38	-	38R	s,st,g	-	-
25	423555NO722134.1	4-57	479	-	76	-	-	s	-	7
PHILLIPSTON										
Mass. Dept. Public Works Bridge Borings										
4	423443NO701012.1	4-59	1129	-	22.5	-	12.5	s	-	8
5	423422NO720915.1	9-58	1210	-	20.5	-	13.5	s	-	-
ROYALSTON										
Mass. Dept. Public Works Bridge Boring										
9	424256NO721046.1	7-58	973	-	24.5	-	24.5R	s,g	-	5
TEMPLETON										
U.S. Geological Survey Auger Borings										
A2	423252NO720518.1	11-66	845	A	52	4	52R	s,g	icd	7
										Iron = >1.0; specific conductance = 60.
A3	423236NO720514.1	11-66	880	A	22	4	22R	g	icd	-
Mass. Dept. Public Works Bridge Borings										
13	423548NO720528.1	2-42	828	-	30	-	-	s,g	-	-
21	423655NO720442.1	10-41	906	-	33.5	-	33.5	s	-	-

Table 3.--Records of selected borings--Continued

	:	:	:	:	:	:	:	Depth	:	:	:	:											
	:	:	:	:	:	:	:	to	:	:	:	:											
Boring	:	Location	:	Date	:	of land-	:	Type	:	Depth	:	Diameter:	:	bedrock:	:	<u>Material</u>	:	Water	:	Remarks			
no.	:	:	:	:	:	surface	:	of	:	of	:	of	:	of	:	or	:	Character:	:	Geologic:	:	level	:
	:	:	:	:	:	datum	:	boring:	:	boring:	:	boring:	:	refusal:	:	:	:	unit	:	:	:	:	:
	:	:	:	:	:	(feet)	:	(feet)	:	(inches)	:	(feet)	:	:	:	:	:	:	:	:	:	:	:

WARWICK

U.S. Geological Survey Auger Boring

A1 : 423833N0722036.1 : 11-66 : 670 : A : 45.5 : 4 : 45.5R : s,g : icd : 17 : Iron = >1.0; specific
: : : : : : : : : : : : : : : : : conductance = 32.

WINCHENDON

U.S. Geological Survey Auger Borings

A1 : 423758N0720656.1 : 11-66 : 830 : A : 27 : 4 : 27R : s,g,cl : ow : 10 :
A2 : 424003N0720638.1 : 11-66 : 857 : A : 47 : 4 : 47R : s,g : ow : 15 : Iron = >1.0; specific
: : : : : : : : : : : : : : : : : conductance = 30.
A3 : 423905N0720631.1 : 11-66 : 840 : A : 35 : 4 : 35 : s,g,cl : ow : 5 : Iron = .92; specific
: : : : : : : : : : : : : : : : : conductance = 52.
A4 : 423928N0720629.1 : 11-66 : 850 : A : 47 : 4 : 47R : s,g,cl,st : ow : 20 :
A5 : 423816N0720515.1 : 11-66 : 858 : A : 122 : 4 : 122R : s,g,st : ow : 40 :

Mass. Dept. Public Works Bridge Borings

2 : 424134N0720112.1 : 9-36 : 1008 : - : 19 : - : - : s,g : - : 0 : 1 of 17 borings.
5 : 424103N0720501.1 : 2-58 : 838 : - : 48 : - : 48R : s,g : - : 8.5 : At brook.
6 : 424034N0720404.1 : 3-52 : 902 : - : 10.5 : - : 10.5R : s,g : - : - : 1 of 4 borings.
13 : 424043N0720254.1 : 9-36 : 951 : - : 16.5 : - : 16.5R : t : - : - : 1 of 19 borings.
18 : 424145N0720056.1 : - : 1010 : - : 16 : - : 16R : s,g : - : - : 1 of 14 borings.
20 : 423920N0715918.1 : 9-36 : 1016 : - : 16 : - : 16R : s,g : - : - : 1 of 4 borings.
29 : 423745N0720505.1 : 2-42 : 881 : - : 5 : - : 5R : s,g : - : 8 : 1 of 7 borings.

Table 4.--Logs of selected wells and test wells
(Depths are given in feet below land surface)

Depth		Depth		Depth	
ATHOL 10.		ATHOL 49.		ATHOL 62.	
Black loam.....	0 - 0.5	Peat.....	0 - 8	Medium, brown sand and	
Dry, coarse gravel.....	.5 - 12	Fine, brown sand.....	8 - 16	small gravel.....	0 - 23
Medium to coarse gravel, very		Fine sand and medium gravel.....	16 - 24	Silty, yellow sand.....	23 - 45
little circulation.....	12 - 23.4	Layers of clay and sharp gravel.	24 - 27	Fine sand; streaks of gray clay.	45 - 78
Refusal.....	at 28.4	Sand and gravel mixed with		Silty, yellow sand.....	78 - 85
		sharp rock.....	27 - 32	Refusal.....	at 85
		Refusal.....	at 32		
ATHOL 13.		ATHOL 50.		ATHOL 63.	
Medium to fine sand.....	0 - 14	Fine, brown sand.....	0 - 16	Medium sand; small gravel.....	0 - 8
Fine sand.....	14 - 19	Fine sand and medium gravel.....	16 - 24	Medium, brown sand; small gravel	8 - 72
Medium to fine sand with clay....	19 - 24	Sand and medium gravel.....	24 - 32	Medium, brown sand; fine	
Brown silt.....	24 - 32	Sand and gravel.....	32 - 36.5	grained sand.....	72 - 80
Medium to coarse gravel.....	32 - 56	Refusal.....	at 36.5	Medium fine gray sand; clay.....	80 - 88
Fine sand.....	56 - 77.5			Medium fine sand; small gravel;	
Refusal.....	at 77.5			clay.....	88 - 91
				Bedrock.....	at 91
ATHOL 14.		ATHOL 51.		ATHOL 64.	
Black topsoil.....	0 - 1	Fine, brown sand.....	0 - 16	Black muck and clay.....	0 - 10
Hardpan.....	1 - 10	Fine sand and medium gravel....	16 - 24	Gray, fine sand.....	10 - 35
Medium to fine gravel.....	10 - 25	Sand and medium gravel.....	24 - 32	Gray sand; medium gravel.....	35 - 45
Medium to coarse gravel.....	25 - 30	Sand and gravel.....	32 - 36.5	Brown, fine sand.....	45 - 60
Medium to coarse gravel with		Refusal.....	at 36.5	Brown, medium gravel.....	60 - 70
large amount of fine sand.....	30 - 40.5			Brown, coarse sand.....	70 - 85
Fine sand.....	40.5 - 78.2			Brown, medium sand.....	85 - 90
				Gray, silty sand.....	90 - 95
ATHOL 17.		ATHOL 53.		ATHOL 65.	
Black muck.....	0 - .5	Topsoil.....	0 - 1	Boulders; medium and small	
Coarse gravel.....	.5 - 10	Cobbles and coarse sand.....	1 - 12	gravel; clay.....	0 - 8
Coarse gravel, large amount of		Medium to coarse sand.....	12 - 18	Medium sand; small gravel; clay.	8 - 19
sand.....	10 - 20	Refusal.....	at 18	Refusal.....	at 19
Medium to coarse sand.....	20 - 25				
Coarse sand.....	25 - 27	ATHOL 54.		ATHOL 66.	
Coarse gravel.....	27 - 27.3	Fine grained sand and sharp		Peat.....	0 - 4
		gravel.....	0 - 19	Fine sand and gravel.....	4 - 23
		Medium, brown sand; some gravel.	19 - 57	Sand and fine gravel.....	23 - 49
		Fine, yellow sand; sharp gravel;		Fine sand and gravel.....	49 - 60
		clay.....	57 - 60	Fine sand; fine gravel; trace of	
		Hard packed gravelly sand and		clay.....	60 - 72
		gravel.....	60 - 67		
		Refusal.....	at 67	ATHOL 67.	
ATHOL 18.				Sand and gravel.....	0 - 10
Coarse sand.....	0 - 42.1			Hard packed sand; gravel; clay..	10 - 17
Refusal.....	at 42.1			Refusal.....	at 17
ATHOL 19.		ATHOL 55.		ATHOL 68.	
Dry, coarse gravel.....	0 - 5	Loam.....	0 - 2	Sand; gravel; boulders.....	0 - 9
Refusal.....	at 5	Hard packed sand and gravel....	2 - 15	Hard packed sand; gravel;	
		Coarse, brown sand and		traces of clay.....	9 - 17
		sharp gravel.....	15 - 48	Fine, black sand and sharp	
ATHOL 20.		Medium, brown sand.....	48 - 61	gravel.....	17 - 25.5
Black topsoil.....	0 - .5	Fine to medium; brown sand.....	61 - 68	Refusal.....	at 25.5
Coarse gravel.....	.5 - 22	Hardpan.....	68 - 72		
Refusal.....	at 22	Refusal.....	at 72	ATHOL 69.	
ATHOL 25.				Peat.....	0 - 2
Clay layer in upper part; gravel.	0 - 12			Fine, brown sand.....	2 - 10
"Flour" sand.....	12 - 28			Fine, red and brown sand.....	10 - 20
ATHOL 29.		ATHOL 56.		Fine, red and brown, silty sand	
Light topsoil.....	0 - 1	Hard packed sand.....	0 - 20	and scattered gravel.....	20 - 30
Fine sand and cobbles.....	1 - 10.5	Coarse sand.....	20 - 30	Fine, red sand and gravel;	
Medium to coarse gravel, good		Sand and gravel.....	30 - 40	gray clay.....	30 - 35
circulation.....	10.5 - 20	Medium gravel.....	40 - 50	Fine, brown, silty sand and	
Medium to fine sand, very little		Sand and gravel.....	50 - 64	scattered gravel.....	35 - 45
circulation.....	20 - 40.5	Ledge.....	at 64	Fine, brown sand.....	45 - 63
Fine sand.....	40.5 - 79				
Medium to fine sand.....	79 - 80	ATHOL 57.		ATHOL 70.	
Refusal.....	at 80	Loam.....	0 - 2	Coke fill.....	0 - 6
		Hard packed sand and gravel....	2 - 14	Tar.....	6 - 9
ATHOL 30.		Medium, brown sand and sharp		Fine, silty sand; like clay.....	9 - 11
Black topsoil.....	0 - 1	gravel.....	14 - 48	Fine sand and gravel.....	11 - 18
Coarse gravel, dry.....	1 - 7	Fine to medium light gray sand		Fine to medium sand with black	
Coarse sand, some color variation	7 - 21	and small gravel.....	48 - 57	specks.....	18 - 28
Coarse sand.....	21 - 22.5	Fine, gray sand and clay.....	57 - 61	Medium sand and gravel.....	28 - 39
Coarse sand and gravel.....	22.5 - 28.5	Refusal.....	at 61		
Gravel.....	28.5 - 34			ATHOL 71.	
Gravel with trace of clay.....	34 - 39.1	ATHOL 58.		Fill.....	0 - 2
Refusal.....	at 39.1	Loam.....	0 - 3	Sand, medium grained with clay..	2 - 13
		Hard packed sand and gravel....	3 - 18	Sand, medium to fine; some silt.	13 - 20.5
ATHOL 31.		Fine to medium yellow sand.....	18 - 47		
Topsoil.....	0 - 2	Medium sand and gravel.....	47 - 66	ERVING 19.	
Fine sand.....	2 - 41.5	Refusal.....	at 66	Sand and gravel.....	0 - 16
Medium sand with trace of clay...	41.5 - 43.5			Silt.....	16 - 82
Medium coarse sand, very poor		ATHOL 59.		Bedrock.....	82 - 297
circulation.....	43.5 - 45	Loam.....	0 - 2		
Refusal.....	at 45	Fine, brown sand.....	2 - 20	GARDNER 13.	
		Silty, gray.....	20 - 35	Sand, some gravel.....	0 - 9.5
ATHOL 32.		Medium, light gray sand and		Clay.....	9.5 - 17.5
Fine sand.....	0 - 5	gravel.....	35 - 48		
Medium gravel.....	5 - 24.2	Medium, light gray sand.....	48 - 60	GARDNER 15.	
Refusal.....	at 24.2	Fine to medium, light gray sand.	60 - 75	Fine sand.....	0 - 18
		Fine, gray sand and clay.....	75 - 80	Rock.....	at 18
ATHOL 44.		ATHOL 60.		GARDNER 16.	
Dry sand.....	0 - 60	Fine, brown sand and sharp		Fine sand.....	0 - 10
Hard granite.....	60 - 100	gravel.....	0 - 19	Rock.....	at 10
Soft rock.....	100 - 113	Silt; yellow sand.....	19 - 31		
		Silt; gray sand and clay.....	31 - 46	GARDNER 17.	
		Refusal.....	at 46	Hardpan; sand; gravel.....	0 - 19
				Rock.....	at 19
ATHOL 47.					
Fine, brown sand.....	0 - 16	ATHOL 61.			
Fine sand and small gravel.....	16 - 32	Sand and gravel fill.....	0 - 6		
Fine sand, small gravel with		Fine, gray sand; sharp gravel			
silt on bottom.....	32 - 37	and clay.....	6 - 21		
Refusal.....	at 37	Fine, light gray sand; some			
		sharp gravel.....	21 - 32		
ATHOL 48.		Hard packed, gray sand; gravel;			
Peat.....	0 - 13	clay.....	32 - 46		
Fine, brown sand.....	13 - 32	Refusal.....	at 46		
Fine sand, scattered gravel.....	32 - 40				
Fine, silty sand.....	40 - 42				
Refusal.....	at 42				

Table 4.--Logs of selected wells and test wells--Continued

	Depth		Depth		Depth
<u>GARDNER 18.</u>		<u>ORANGE 2.</u>		<u>ORANGE 58.</u>	
Mud.....	0 - 10	Soil.....	0 - 4	Soil and oxidized sand, brown,	
Sand.....	10 - 15	Sand and gravel.....	4 - 18.6	fine to medium.....	0 - 2
Rock.....	at 15	Fine sand.....	18.6 - 24	Medium to fine, well sorted	
		Sand and gravel.....	24 - 31.4	sand; some clay with depth....	2 - 22
<u>GARDNER 19.</u>		Brown sand.....	31.4 - 43		
Mud.....	0 - 10	Yellow sand.....	43 - 51	<u>ORANGE 59.</u>	
Sand and clay.....	10 - 20	Brown sand and gravel.....	51 - 57	Brown, oxidized sand, coarse to	
Sand and gravel.....	20 - 23	Gray sand and gravel.....	57 - 62	medium.....	0 - 4
Rock.....	at 23	Gray and brown sand.....	62 - 71	Gravelly sand, 2-in. pebbles:	
		Brown sand and fine gravel.....	71 - 77.5	quartz, rounded.....	4 - 7
<u>GARDNER 20.</u>		Rock.....	at 77.5	Not reported.....	7 - 12
Sand and gravel.....	0 - 8			Very coarse rounded, brighter	
Clay.....	8 - 17	<u>ORANGE 5.</u>		orange-brown than above,	
Sand and gravel.....	17 - 42.1	Sand, medium to coarse.....	0 - 12	saturated sand.....	12 - 17
Rock.....	at 42.1	Sand; fine gravel.....	12 - 17	Light gray sand.....	17 - 21
		Sand, coarse; fine gravel.....	17 - 22		
<u>GARDNER 21.</u>		Sand, fine to medium.....	22 - 27	<u>ORANGE 60.</u>	
Sand and gravel.....	0 - 8			Soil.....	0 - 4
Clay.....	8 - 18	<u>ORANGE 42.</u>		Clay, brown, oxidized, silty....	4 - 7
Clay and quicksand.....	18 - 53	Topsoil.....	0 - 1	Clay, changing to gray clay at	
Rock.....	at 53	Sand; gravel; rocks.....	1 - 24	10 to 12 ft.....	7 - 12
		Gravel, some sand.....	24 - 29.5	Gray clay, no silt.....	12 - 60
<u>GARDNER 22.</u>		Refusal.....	at 29.5	Hard layer, penetrated.....	at 60
Fine sand.....	0 - 26			Bedrock.....	at 62.5
Rock.....	at 26	<u>ORANGE 43.</u>			
<u>GARDNER 23.</u>		Topsoil.....	0 - 1	<u>ORANGE 61.</u>	
Clay and fine sand.....	0 - 37	Sand; some gravel.....	1 - 16	Soil, sandy, humus.....	0 - 4
		Sand and gravel.....	16 - 29	Sand, coarse and very coarse,	
<u>GARDNER 24.</u>		Gravel; some sand.....	29 - 34	some pebbles.....	4 - 7
Sand and gravel.....	0 - 10	Gravel and sand.....	34 - 44.8	Sand, coarse, brown, oxidized...	7 - 12
Coarse sand and gravel.....	10 - 44	Refusal.....	at 44.8	Sand, coarse, brown, oxidized;	
Sand and gravel.....	44 - 48.5			gray clay and sand at 34 ft...	12 - 37
Rock.....	at 48.5	<u>ORANGE 44.</u>		Gray clay and sand, saturated...	37 - 42
<u>GARDNER 25.</u>		Topsoil.....	0 - 1		
Coarse brown sand.....	0 - 33	Sand and gravel.....	1 - 29	<u>ORANGE 62.</u>	
Fine gray sand.....	33 - 40	Coarse sand and gravel.....	29 - 34	Soil, boulders, fill.....	0 - 7
Fine sand and gravel.....	40 - 49.8	Sand and gravel.....	34 - 45.4	Sand and gravel, dirty brown...	7 - 12
		Refusal.....	at 45.4	Coarse sand, not too well sorted	12 - 22
<u>GARDNER 26.</u>					
Sand.....	0 - 27	<u>ORANGE 45.</u>		<u>PHILLIPSTON 1.</u>	
Sand, some gravel.....	27 - 54	Topsoil.....	0 - 1	Swamp muck and boulders.....	0 - 7.5
Gravel.....	54 - 59	Sand and gravel.....	1 - 40	Refusal.....	at 7.5
		Gravel.....	40 - 44		
<u>GARDNER 27.</u>		<u>ORANGE 46.</u>		<u>PHILLIPSTON 2.</u>	
Brown sand and gravel.....	0 - 40	Topsoil.....	0 - 1	Swamp muck and boulders.....	0 - 13
Loose, brown sand.....	40 - 46	Sand and gravel.....	1 - 16	Refusal.....	at 13
Sand and gravel.....	46 - 54.5	Fine sand; gravel; boulders....	16 - 26		
		Refusal.....	at 26	<u>PHILLIPSTON 3.</u>	
<u>GARDNER 28.</u>				Swamp muck and boulders.....	0 - 5
Mud.....	0 - 6	<u>ORANGE 48.</u>		Refusal.....	at 5
Gray sand and gravel.....	6 - 22	Topsoil.....	0 - 1		
Coarse, gray sand and gravel....	22 - 39	Sand; some gravel.....	1 - 39	<u>TEMPLETON 3.</u>	
		Gravel; some sand.....	39 - 44	Sand and cobbles.....	0 - 2
<u>GARDNER 29.</u>				Sand, coarse, wet near end.....	2 - 12
Fine sand and clay.....	0 - 14	<u>ORANGE 49.</u>		Sand, coarse; fine gravel.....	12 - 18
Sand.....	14 - 18	Topsoil.....	0 - 1	Silt and clay, sandy, blue.....	18 - 22
Sand and clay.....	18 - 25	Sand and gravel.....	1 - 40	Sand and gravel.....	22 - 24
Clay and gravel.....	25 - 28	Refusal.....	at 40	Refusal, bedrock or boulders...	at 24
Rock.....	at 28				
<u>GARDNER 30.</u>		<u>ORANGE 50.</u>		<u>TEMPLETON 4.</u>	
Fine sand; gravel; and clay.....	0 - 30	Topsoil.....	0 - 1	Silt, sandy, brown, humus.....	0 - 2
Hardpan, sand and gravel.....	30 - 7.5	Sand and scattered gravel.....	1 - 16	Sand, gravel, cobbles.....	2 - 7
Rock.....	at 7.5	Sand; gravel; boulders.....	16 - 22	Sand, gravel, fewer cobbles....	7 - 18
		Sand and gravel.....	22 - 30.2	Sand, fine to medium, becoming	
<u>GARDNER 31.</u>				clayey with depth.....	18 - 22
Clay; sand; gravel.....	0 - 16	<u>ORANGE 51.</u>		Silt, clay, fine sand; gray....	22 - 26
Rock.....	at 16	Gravel.....	0 - 15	Refusal, bedrock or boulder....	at 26
		Brown silt.....	15 - 40		
<u>GARDNER 32.</u>		Clay.....	40 - 79	<u>TEMPLETON 18.</u>	
Sand and gravel.....	0 - 10			Brown clay; boulder gravel.....	0 - 10
Rock.....	at 10	<u>ORANGE 52.</u>		Brown sand.....	10 - 15
		Gravel.....	0 - 10	Gray clay; hard packed gravel...	15 - 35
<u>GARDNER 33.</u>		Silt.....	10 - 50	Gray hard gravel; dry.....	35 - 40
Sand and gravel.....	0 - 12.5	Clay.....	50 - 75	Gray broken gravel.....	40 - 45
Rock.....	at 12.5			Gray, hard clay.....	45 - 53
<u>MONTAGUE 54.</u>		<u>ORANGE 53.</u>		Hardpan.....	53 - 56
Sandy loam.....	0 - .5	Gravel.....	0 - 6	Refusal.....	at 56
Fine sand.....	.5 - 17	Silt and clay.....	6 - 94		
Sand and gravel.....	17 - 21.6	Gravel and clay.....	94 - 98	<u>TEMPLETON 22.</u>	
Refusal.....	at 21.6			Peat mud.....	0 - 11
		<u>ORANGE 54.</u>		Fine sand and clay.....	11 - 47
<u>MONTAGUE 55.</u>		Silt.....	0 - 15	Rock.....	at 47
Sandy loam.....	0 - .5	Clay.....	15 - 55		
Fine sand.....	.5 - 17	Sandy clay.....	55 - 59	<u>TEMPLETON 27.</u>	
Sand and gravel.....	17 - 92			Fine sand, brown.....	0 - 2
Fine sand; silt with mica		<u>ORANGE 56.</u>		Sand, fine to very fine, lighter	
particles.....	92 - 121.4	Fill.....	0 - 4	brown.....	2 - 17
Refusal.....	at 121.4	Dry sand, well sorted, brown,		Coarse sand, saturated, ..	
		medium to coarse; some pebbles		yellow-brown.....	17 - 22
<u>NEW SALEM 3.</u>		at 27 ft.....	4 - 27	Coarse sand, yellow-brown.....	22 - 27
Soil.....	0 - 2	Dry sand, well sorted, brown,		Coarse to very coarse sand,	
Very coarse, pebbly brown sand...	2 - 7	medium to coarse.....	27 - 42	yellow-brown.....	27 - 37
Medium to coarse, light brown		Sand, very coarse to coarse,		Coarse to very coarse sand,	
sand.....	7 - 22	well sorted, micaceous,		yellow-brown; gravel.....	37 - 47
		feldspathic, sub-angular.....	at 42		
		<u>ORANGE 57.</u>			
		Medium, brown sand, well sorted.	0 - 17		
		Coarse, brown sand.....	17 - 22		

Table 4.--Logs of selected wells and test wells--Continued

Depth		Depth		Depth	
<u>TEMPLETON 28.</u>		<u>TEMPLETON 40.</u>		<u>TEMPLETON 50.</u>	
Medium, gray sand, pebbly.....	0 - 7	Peat.....	0 - 5	Peat.....	0 - 4
Medium, gray sand, pebbly; gravel at 10 to 12 ft.....	7 - 12	Fine sand.....	3 - 20	Brown sand; gravel; clay.....	- 10
Gravel and sand.....	12 - 15	Very fine sand.....	20 - 24.0	Brown sand; gravel.....	10 - 35
Poorly sorted, fine to coarse sand.....	15 - 17	Refusal, ledge.....	at 24.0	Gray, fine sand.....	35 - 71.5
Medium to coarse, saturated sand.	17 - 32	<u>TEMPLETON 42.</u>		<u>TEMPLETON 51.</u>	
Coarse to very coarse sand (biotite) gray streaks.....	32 - 47	Fine to medium, tan sand; small, sharp gravel; specks of clay.....	0 - 20	Peat.....	0 - 3
Coarse to very coarse sand.....	47 - 77	Fine, gray sand and clay.....	20 - 32	Gray, brown, fine sand; clay....	3 - 4t
Very coarse sand.....	77 - 85	Fine to medium, tan sand; small gravel.....	32 - 57	Brown, fine sand.....	4t - 75
Gravel.....	85 - 87	Fine, brown sand and clay.....	57 - 62.5	<u>TEMPLETON 52.</u>	
Very coarse sand.....	87 - 92	Not reported.....	62.5 - 66.2	Brown sand; gravel.....	0 - 20
Gravel.....	92 - 95	Refusal.....	at 66.2	Brown sand; gravel; clay.....	20 - 25
Refusal, bedrock (?).....	at 95	<u>TEMPLETON 43.</u>		Brown, fine sand.....	25 - 3t
<u>TEMPLETON 29.</u>		Fine, tan sand; small gravel; clay.....	0 - 21	Brown, fine sand; clay.....	36 - 52
Peat; small gravel; medium sand..	0 - 5	Fine, gray sand; sharp gravel; clay.....	21 - 36	<u>TEMPLETON 53.</u>	
Medium sand; coarse gravel.....	5 - 15	Hardpan.....	36 - 37.5	Peat.....	0 - 7
Medium sand; small gravel.....	15 - 30	Refusal.....	at 37.5	Gray, brown sand.....	7 - 20
Medium to coarse sand; small gravel.....	30 - 50	<u>TEMPLETON 44.</u>		Brown, medium sand.....	20 - 51
Coarse sand; small gravel.....	50 - 65	Fine, brown sand; clay.....	0 - 26	Gray, fine sand.....	51 - 69
Medium to coarse, red sand; small gravel; fine sand; some clay; broken stone.....	65 - 80	Fine, gray sand; sharp gravel; clay.....	26 - 53.6	<u>TEMPLETON 54.</u>	
<u>TEMPLETON 30.</u>		Refusal, hardpan.....	at 53.6	Loam.....	0 - 2
Sand and gravel.....	0 - 20	<u>TEMPLETON 45.</u>		Gray clay and sharp gravel.....	2 - 18
Very fine sand.....	20 - 32.5	Peat.....	0 - 6	Medium, brown sand.....	18 - 33
Refusal, ledge.....	at 32.5	Fine, gray sand with clay and gravel, changing to brown; pumped all sand.....	6 - 26	Fine to medium, brown sand; some clay.....	33 - 47
<u>TEMPLETON 31.</u>		Fine, brown sand; some small gravel; pumped all fine sand..	26 - 47	Refusal.....	at 47
Sand and gravel.....	0 - 15	Fine, brown sand.....	47 - 63.5	<u>WINCHENDON 20.</u>	
Fine sand.....	15 - 30.5	Fine, brown sand, some gravel; pumped all fine sand.....	63.5 - 90	Fine sand and clay.....	0 - 21
Refusal, ledge.....	at 30.5	Not reported.....	90 - 92.5	Sand and clay.....	21 - 41
<u>TEMPLETON 32.</u>		Refusal.....	at 92.5	Sand, hard-packed, and clay....	41 - 47
Sand and gravel.....	0 - 20	<u>TEMPLETON 46.</u>		<u>WINCHENDON 21.</u>	
Very fine sand.....	20 - 29.3	Fine, brown sand and gravel....	0 - 20	Sand (some fine).....	0 - 22
Refusal, ledge.....	at 29.3	Fine, brown sand.....	20 - 74	Sand, fine; changing to sand,	22 - 43
<u>TEMPLETON 34.</u>		Fine, brown sand; some small gravel.....	74 - 95	red.....	43 - 54
Peat.....	0 - 3	<u>TEMPLETON 47.</u>		Sand, fine.....	43 - 54
Medium sand.....	3 - 15	Fine, brown sand and gravel with clay and sand getting finer with depth.....	0 - 21	Ledge.....	at 54
Very fine sand.....	15 - 19.8	Fine, brown sand with specks of clay.....	21 - 68	<u>WINCHENDON 31.</u>	
Refusal, ledge.....	at 19.8	Fine to medium sand with specks of clay.....	68 - 80	Gravel (up to 2½ inches in size).....	0 - 4
<u>TEMPLETON 35.</u>		<u>TEMPLETON 48.</u>		Sand, medium to coarse; some pebbles.....	4 - 7
Sand and gravel, pumped free.....	0 - 25	Peat.....	0 - 8	Medium sand.....	7 - 12
Sand, getting finer, pumped very tight.....	25 - 30	Gray sand.....	8 - 25	Medium sand (water at 27+ feet).....	12 - 42
Very fine sand.....	30 - 37.5	Brown, fine sand.....	25 - 41	<u>WINCHENDON 32.</u>	
Refusal, ledge.....	at 37.5	Gray, fine sand.....	41 - 78	Gravel.....	0 - 3
<u>TEMPLETON 36.</u>		<u>TEMPLETON 49.</u>		Gravel; sand, medium to coarse at 6+ feet.....	3 - 7
Sand and gravel.....	0 - 15	Gray, brown, sharp gravel and sand.....	0 - 15	Medium sand with some coarse sand.....	7 - 27
Very fine sand.....	15 - 34.8	Gray, brown sand and gravel....	15 - 25	Coarse sand (some medium sand)	27 - 67
Refusal, ledge.....	at 34.8	Gray, fine sand.....	25 - 81	biotitic.....	27 - 67
<u>TEMPLETON 37.</u>		<u>TEMPLETON 50.</u>		Coarse sand (some medium sand)	67 - 72
Sand and gravel.....	0 - 8	Peat.....	0 - 3	biotitic; silty clay at 67 feet.....	72 - 74
Very fine sand.....	8 - 27.3	Gray.....	3 - 4	Silty clay.....	74 - 77
Refusal, ledge.....	at 27.3	Sand and gravel.....	4 - 20	Gravel.....	74 - 77
<u>TEMPLETON 39.</u>		Very fine sand.....	20 - 38.5	Refusal, bedrock.....	at 77
Sand.....	0 - 3	Refusal, ledge.....	at 38.5		
Peat.....	3 - 4				
Sand and gravel.....	4 - 20				
Very fine sand.....	20 - 38.5				
Refusal, ledge.....	at 38.5				

(Depths are given in feet below land surface)

Depth		Depth		Depth	
ASHBURNHAM		31.		W3.	
U.S. Geological Survey Auger Boring		Loamy sand and boulders..... 0 - 3.5		Loam; sand; gravel; and boulders fill..... 0 - 3.5	
A1.		Compact fine yellow sand, gravel, and boulders..... 3.5 - 5.5		Compact, medium to fine, yellow sand and gravel; some coarse sand; boulders; wet..... 3.5 - 8.5	
Sand, light brown, medium..... 0 - 7		Compact fine yellow sand, gravel, clay, and boulders.... 5.5 - 15		Rock, hard light gray schist; some quartzite in granite, some calcite lenses badly fractured at 45°; specific gravity 2.65-2.82; no water... 8.5 - 16.5	
Sand, grayish-brown, fine; some gravel; water at 12 ft..... 7 - 12		Hard, compact, fine gray sand, gravel, clay, and boulders.... 15 - 25			
Sand, grayish-brown, very fine, poorly sorted; some gravel..... 12 - 14		Hard, compact, fine gray sand, gravel, and boulders..... 25 - 27			
Till, tight..... 14 - 22		Refusal..... at 27			
Refusal, in till..... at 22		32.		W4.	
Mass. Dept. Public Works Bridge Boring		Clean, coarse, yellow sand and boulder fill..... 0 - 8		Hot top..... 0 - .1	
15.		Medium yellow sand and gravel... 8 - 11.5		Firm, coarse, yellow sand; some gravel and medium sand; boulders; wet..... .1 - 4	
Cinder fill..... 0 - 2		Medium yellow sand, little gravel, and boulders..... 11.5 - 17.5		Firm, fine to medium, silty, yellow sand; some gravel; trace of clay; boulders; wet.. 4 - 8.5	
Fine sand..... 2 - 7		Soft, decayed rock or boulders.. 17.5 - 23		Very hard to fine, silty, gray sand and gravel; trace of clay; boulders; wet..... 8.5 - 9.5	
Sand, gravel, and boulders..... 7 - 18		Refusal (rock or boulders)..... at 23		Refusal..... at 9.5	
=====		33.		W5.	
ATHOL		Medium, yellow sand..... 0 - 3		Soft loam..... 0 - 1	
Mass. Dept. Public Works Bridge Borings		Yellow, coarse sand and gravel.. 3 - 5.5		Firm, medium to fine, yellow sand, some gravel and coarse sand; boulders, dry..... 1 - 8	
13.		Firm, medium sand..... 5.5 - 8.6		Refusal..... at 8	
Cinder and gravel fill..... 0 - 2.5		34.		W6.	
Firm yellow sand; water at 5 ft.. 2.5 - 5.5		Loam..... 0 - 2		Loose, dark yellow-brown sand; gravel; miscellaneous fill; wet; water at 5 ft..... 0 - 6	
Hard yellow sand and fine gravel. 5.5 - 11.5		Coarse, brown sand, little gravel..... 2 - 7		Firm, medium to fine, yellow sand; some gravel; moist..... 6 - 10.5	
Hard sand and gravel..... 11.5 - 14.5		Hard-packed sand, gravel, and boulders..... 7 - 9.5		Very compact, medium to fine, yellow sand and gravel; some coarse sand; wet..... 10.5 - 14.5	
Hard sand and gravel, little clay, hardpan..... 14.5 - 18		Refusal..... at 9.5		Refusal..... at 14.5	
16.		35.			
Sand, gravel, fill..... 0 - 5.5		Peat..... 0 - 3			
Coarse sand..... 5.5 - 10		Muck..... 3 - 19.6			
Cemented sand, gravel, little clay, hardpan..... 10 - 16		Hard bottom..... at 19.6			
Rock or boulder..... at 16		=====			
17.		ERVING			
Sand and gravel..... 0 - 2		Mass. Dept. Public Works Bridge Borings		1.	
Ledge..... at 2		2.		Wet, loose, brown, coarse to fine sand and coarse to fine gravel; boulders, little silt, fill..... 0 - 4	
18.		Dirty sand..... 0 - 6		Wet, loose, brown coarse to fine sand; trace of organic matter. 4 - 8	
Loam and fine sand..... 0 - 4		Firm, coarse, gray sand and little, fine gravel..... 6 - 13		Wet, medium, dense, gray, coarse to fine sand; and coarse to fine gravel; little silt..... 8 - 11	
Cobblestones, piece of wood..... 4 - 5		Hard, coarse, gray sand, and little, fine gravel..... 13 - 19		Not described..... 11 - 15	
Coarse sand, some gravel, packed loose, full of water..... 5 - 9		Hard, fine, yellow sand, and little fine gravel..... 19 - 22		Wet, stiff, gray silt, some fine sand..... 15 - 18	
Coarse sand, packed loose, full of water..... 9 - 16		5.		Wet, soft, gray silt, some fine sand, little clay..... 18 - 27	
Few stones, fine sand..... 16 - 16.5		Riprap boulders, fill..... 0 - 5		Wet, very dense, brown, coarse to fine sand; and coarse to fine gravel; little silt..... 27 - 29	
Coarse sand and gravel, wet, packed firm..... 16.5 - 22		Cemented sand, gravel, hardpan.. 5 - 10.5		29.	
Coarse sand and gravel, packed hard..... 22 - 23		Boulders or rock..... at 10.5		Mud..... 0 - 2	
Hard packed gravel, hardpan..... 23 - 24		13.		Silt, sand and gravel..... 2 - 6	
Rock..... at 24.5		Hard, fine, gray sand, and little gravel..... 0 - 10.5		Very fine sand with some clay... 6 - 8.5	
20.		Hard, fine sand..... 10.5 - 15.4		Medium to coarse sand with some gravel..... 8.5 - 19	
Coarse sand and gravel..... 0 - 13		16.		Compact sand, gravel, and clay.. 19 - 22	
Gravel..... 13 - 14		Gravel, small boulders, little loam..... 0 - 5.5		Rock obstruction..... at 22	
Sand and clay..... 14 - 24		Coarse, yellow sand, very little gravel..... 5.5 - 9		30.	
Sand, clay, and gravel..... 24 - 34		Coarse, hard gravel, sand, small boulders..... 9 - 21.5		Mud..... 0 - 4.5	
Gravel and sand..... 34 - 38		=====		Clay and very fine sand..... 4.5 - 13.5	
21.		GARDNER		Fine sand..... 13.5 - 19.5	
Loose, coarse, yellow sand and gravel; water at 6.5 ft..... 0 - 8		Mass. Dept. Public Works Bridge Borings		Compact sand; gravel; some clay. 19.5 - 24	
Hard, coarse, dark sand, gravel, and boulders..... 8 - 13.5		W1.		Rock obstruction..... at 24	
Hard, fine, blue sand, gravel, and clay; hardpan..... 13.5 - 16		Loose loam; sand; gravel; and boulders..... 0 - 4		31.	
23.		Rock, hard, dark to light gray granite gneiss and schist, some quartzite, badly fractured from 30° to 45°; specific gravity 2.71-2.78.... 4 - 12		Compact sand; gravel; and miscellaneous fill..... 0 - 3	
Sand, gravel, and boulder fill... 0 - 3.5		W2.		Compact, medium to coarse, yellow sand; some gravel; fine sand; boulders; moist.... 3 - 10.5	
Coarse, compact sand, gravel, and clay..... 3.5 - 7		Soft, dark gray, silty peat; moist; water at surface..... 0 - 3.5		Compact, medium to fine, yellow sand; some gravel; coarse sand; boulders; moist..... 10.5 - 16	
Compact sand, gravel, and clay... 7 - 12.5		Soft, silty, yellow-gray clay; moist..... 3.5 - 8		Hard, medium to coarse, gray-yellow sand and gravel; some coarse sand; trace of silt; boulders; wet..... 16 - 19.5	
Rock or boulder refusal..... at 12.5		Soft, gray clay..... 8 - 18		Refusal..... at 19.5	
27.		Firm, coarse to medium, gray sand and gravel; some fine sand; wet..... 18 - 21		No water encountered.	
Sand and gravel..... 0 - 4		Loose, fine to medium, silty sand, some gravel; trace of clay; wet..... 21 - 26.5			
30.		Refusal..... at 26.5			
Silty sand..... 0 - 2.5					
Hard sand, gravel, and boulders.. 2.5 - 4.5					
Loose, coarse sand..... 4.5 - 8.5					
Hard sand, gravel, and clay..... 8.5 - 17					
Refusal..... at 17					

Table 5.--Logs of selected borings--Continued

Depth		Depth		Depth	
GARDNER (Continued)		38. (Continued)		ORANGE	
Mass. Dept. Public Works Bridge Borings (Continued)		Loose, coarse to medium, yellow sand; some gravel and fine sand; wet.....		U.S. Geological Survey Auger Borings	
32.		24 - 30		A1.	
Soft, sandy loam; firm, fine to medium, silty, gray sand; some gravel and medium gray clay; trace of coarse sand.....	0 - 5.5	Loose, medium to fine, gray sand; some gravel; trace of silt; wet.....	30 - 34	Soil.....	0 - 2
Firm, medium to fine silty, yellow sand; some gravel and soft clay; trace of boulders...	5.5 - 13	Compact fine to medium gray, yellow sand; some gravel; trace of clay; boulders; moist.....	34 - 38	Fill, gravelly, dark gray, light gray at about 5 ft.....	2 - 7
Compact, fine to medium yellow sand; some coarse sand; trace of gravel and boulders.....	13 - 18	Refusal.....	at 38	Refusal.....	at 7
Very compact, medium to fine silty, yellow sand; some gravel and coarse sand; trace of clay; boulders.....	18 - 24	39.		A2.	
33.		Very loose, medium to fine, peaty, yellow sand; trace of gravel.....	0 - 6	Fine sand.....	0 - 7
Very loose, black cinders; fill; wet.....	0 - 5.5	Soft, gray, silty clay; moist...	6 - 9.5	Fine sand and silt.....	7 - 12
Firm, fine to medium, yellow sand and gravel; fill; moist.....	5.5 - 12	Firm, medium to coarse, yellow sand; some gravel and fine sand; boulders; wet.....	9.5 - 15	Refusal (bedrock).....	at 13.5
Very loose, medium to fine, loamy dark-yellow sand; some gravel; coarse sand and silt; fill.....	12 - 16.5	Firm, coarse to medium, yellow sand; some gravel and fine sand; boulders; wet.....	15 - 21	A3.	
Firm, medium to fine, leached; dark-yellow sand; some gravel; trace of coarse sand and silt; boulders; wet.....	16.5 - 19.5	Compact, fine, silty, gray sand; trace of gravel and clay; boulders; wet.....	21 - 23	Artificial fill.....	0 - 6
Compact, medium to fine, light yellow sand; some gravel and coarse sand; trace of clay; boulders; wet.....	19.5 - 27	Refusal.....	at 23	Sand, dirty, brown; some gravel.	6 - 7
Refusal.....	at 27	40.		Sand, gravelly.....	7 - 12
34.		Soft loam and boulders.....	0 - 3	Gravel at 16 ft.; dark, nearly black sand, coarse.....	12 - 17
Compact sand; gravel; cinders; boulders; and miscellaneous fill; dry; water level at 3 ft.....	0 - 4.5	Compact, medium to fine, yellow-gray sand; trace of clay; moist.....	3 - 7	Sand, gravelly, dark, iron stained; clayey; water at 20 ft.....	17 - 22
Loose, fine to medium, silty, gray, yellow sand; trace of gravel; moist.....	4.5 - 6.5	Firm, medium to fine, yellow sand; some gravel; trace of coarse sand and silt; wet....	7 - 13	Gray sand, saturated.....	22 - 32
Compact, fine to medium, silty micaceous, yellow sand; some gravel; moist.....	6.5 - 9.5	Very compact, medium to fine, silty, gray sand; some gravel; coarse sand; clay; boulders; wet.....	13 - 14	Gray, very coarse sand, saturated.....	32 - 37
Very compact, medium to fine, leached, yellow sand; some gravel; coarse sand and clay; boulders; moist.....	9.5 - 11	Refusal.....	at 14	Very coarse, pebbly sand, saturated.....	37 - 47
Refusal.....	at 11	=====		Fine gravel.....	47 - 79
35.		HUBBARDSTON		Refusal (bedrock?).....	at 79
Soft, sandy loam.....	0 - 2	U.S. Geological Survey Auger Boring		A4.	
Medium-yellow sand; gravel; and boulders.....	2 - 7.5	A1.		Sand, brownish-gray, coarse to medium, with mica and some mafics; pebbly.....	0 - 5
Medium clay.....	7.5 - 14	Sand, light-brown, medium to coarse; moist.....	0 - 12	Sand, brownish-gray, coarse, with mica and some mafics; 1-inch, well-rounded pebbles..	5 - 10
Medium, gray sand; gravel; boulders; some clay.....	14 - 17.5	Sand, iron-brown, medium to coarse, poorly sorted; and gravel; water at 15 ft.....	12 - 17	Sand, brownish-gray, coarse, with mica and some mafics; 2-inch pebbles at 15 ft.; water at 22 ft.....	10 - 25
Coarse gray sand; gravel; and boulders; trace of clay.....	17.5 - 25	Sand, iron-brown, mostly coarse; and gravel.....	17 - 47	Sand, brownish-gray, coarse, well sorted, with mica and mafics.....	25 - 30
Refusal.....	at 25	Gravel; and gray-brown, coarse sand.....	47 - 52	Sand, brownish-gray, coarse to medium, well sorted, with mica and mafics.....	30 - 41
36.		Sand, gray-brown, coarse to very coarse.....	52 - 62	Sand, brownish-gray, medium to fine, well sorted, with mica and mafics.....	41 - 50
Soft, sandy peat.....	0 - 7	Sand and gravel.....	62 - 78	Clay, blue; and silt; gravel at 56 ft.....	50 - 59
Coarse, dirty, yellow sand; trace of gravel and boulders.....	7 - 10	Till, tight.....	78 - 80	Refusal on bedrock.....	at 59
Coarse, gray sand; trace of gravel	10 - 12	=====		A5.	
Hard, yellow clay.....	12 - 17	MONTAGUE		Sand, light-brown, coarse, quartz-rich; rounded gravel to 12 ft.; water at 16 ft.....	0 - 17
Compact, medium gray sand; some gravel and boulders.....	17 - 20	Mass. Dept. Public Works Bridge Boring		Sand, gray-brown, coarse to medium.....	17 - 22
Refusal.....	at 20	6.		Sand, gray-brown, fine to coarse, poorly sorted.....	22 - 32
37.		Loose sand and gravel.....	0 - 15	Sand, light-brown, fine, well sorted.....	32 - 65
Cinders; miscellaneous fill.....	0 - 6	Firm sand and little gravel....	15 - 31	Silt, blue-gray, sandy.....	65 - 77
Miscellaneous fill; medium, yellow sand; gravel.....	6 - 11	Hard sand and gravel.....	31 - 32.5	Sand, blue-gray, very fine, becoming slightly coarser with depth.....	77 - 94
Sand, gravel; boulders.....	11 - 15	Ledge or boulder.....	at 32.5	Till, clay and silt matrix, with angular gravel.....	94 - 102
Sand; gravel; traces of loam and boulder fill; water at 17 ft...	15 - 18	=====		Refusal (not bedrock).....	at 102
Sandy loam and gravel; traces of fill.....	18 - 22	NEW SALEM		Mass. Dept. Public Works Bridge Borings	
Medium, yellow sand; gravel; some boulders.....	22 - 31	U.S. Geological Survey Auger Boring		2.	
Refusal.....	at 31	A1.		Hard, coarse sand; coarse gravel	0 - 8
38.		Sand, light brown, medium, well sorted with high quartz content and some mafic material; some coarse sand; dry.....	0 - 10	Compact, hard sand and gravel...	8 - 18.5
Very soft, dark brown, peaty swamp mud; wet; water level 1 ft. above land surface datum.	0 - 4	Sand, brown, medium to coarse, abundant quartz and some mafics; some fine gravel; water at 10 ft.....	10 - 27	12.	
Loose, medium to coarse, gray sand; some fine gravel and fine sand; wet.....	4 - 10.5	Sand, gray-brown, fine to coarse; high quartz content; abundant fine-grained mafics; high mica content at 39 ft.; little fine gravel.....	27 - 42	Coarse, yellow sand and gravel..	0 - 6
Loose, fine yellow sand; trace of gravel and silt; wet.....	10.5 - 21	Silt; some gray clay and fine to medium sand.....	42 - 111	Fine, gray sand.....	6 - 10.3
Firm, medium to fine yellow sand; some coarse sand; trace of gravel; wet.....	21 - 24	Till, clay-silt matrix and fine angular gravel.....	111 - 117	Hard, coarse sand and coarse gravel.....	10.3 - 15
		=====		Compact sand and fine gravel; hardpan.....	15 - 17
				Rock-boulder refusal.....	at 17
				21.	
				Medium to fine brown sand; trace of silt.....	0 - 11
				Coarse to fine sand; trace of gravel; loose.....	11 - 16
				Fine sand; trace of silt; little mica; loose.....	16 - 21
				Fine sand; trace of silt; medium compact.....	21 - 34
				Gray silt; some fine sand; medium stiff.....	34 - 37
				Gray silt; some clay; trace of very fine sand in layers; soft	37 - 40

Table 5.--Logs of selected borings--Continued

ORANGE (Continued)			WARWICK						
Depth			Depth		Depth				
Mass. Dept. Public Works Bridge Borings (Continued):			U.S. Geological Survey Auger Boring						
21. (Continued)			A1.						
Fine sand and silt, medium compact.....	40	- 48			Sand, brown, medium to coarse, well stratified, medium sorting; some fine gravel; dry.....	0	- 12		
Soft, gray silt.....	48	- 54			Sand, brown, fine to medium, well sorted, quartz-abundant; water at 17 ft.....	12	- 23		
Gray silt, some clay, soft.....	54	- 66			Sand, dark brown, medium to coarse, medium sorting; fine rounded gravel.....	23	- 28		
Gray silt, some clay, medium stiff.....	66	- 68			Sand, dark brown, fine to coarse; mica flakes; much fine gravel and some coarse gravel.	28	- 42		
Fine sand and silt, medium compact.....	68	- 82			Till, sandy, with much coarse gravel.....	42	- 45.5		
Medium to fine brown sand; trace of silt; compact.....	82	- 93			Refusal, probably in till.....		at 45.5		
No refusal.									
22.			WINCHENDON						
Filled material; loam.....	0	- 1			U.S. Geological Survey Auger Borings				
Brown silt, trace of fine sand, medium stiff.....	1	- 10			A1.				
Brown silt; trace of clay, medium stiff.....	10	- 15			Sand, light brown, medium, well-sorted, quartz-rich; water at 10 ft.....			0	- 12
Very fine sand; trace of silt and clay, medium stiff.....	15	- 20			Sand, light brown, fine, well-sorted, quartz-rich; gravel at 16 ft. and 20 ft.....			12	- 23
Fine to medium sand, loose.....	20	- 24			Sand, brown, fine to medium, quartz- and mica-rich; some gravel.....			23	- 24
Medium to fine sand; fine gravel; trace of silt, medium compact..	24	- 31			Clay?.....			24	- 25
Coarse to fine sand; fine gravel, compact.....	31	- 36			Till.....			25	- 27
Coarse to fine sand; coarse gravel; stones; trace of silt, compact.....	36	- 42			Refusal.....				at 27
Medium to fine sand and gravel; some silt.....	42	- 46			A2.				
Refusal.....		at 46			Sand, light brown, medium, mica-rich.....			0	- 12
23.					Sand, light brown, coarse to medium; water at 15 ft.....			12	- 32
Loamy sand.....	0	- 5			Sand, light brown, coarse to medium, poorly-sorted; some gravel; some clay at 41 ft....			32	- 42
Compact medium sand and gravel...	5	- 11			Till.....			42	- 47
Very compact, medium sand, gravel, and stones.....	11	- 17			Refusal.....				at 47
Refusal.....		at 17			A3.				
24.					Sand, dark brown, coarse, poorly-sorted; some gravel; water at 5 ft.; some clay from 23 ft. to 24 ft.....			0	- 27
Fine sand; some inorganic silt; loose.....	0	- 4			Clay, gray, silty, well-sorted, tight; some sand and gravel...			27	- 32
Coarse sand, medium compact.....	4	- 8			Till?.....			32	- 35
Coarse to fine sand, compact.....	8	- 12			Till or bedrock.....				at 35
Medium sand; some inorganic silt; compact.....	12	- 16			A4.				
Medium sand; some fine gravel; compact.....	16	- 19			Sand, light brown, medium, mica-rich; water at 20 ft.....			0	- 27
Medium sand; trace of inorganic silt; compact.....	19	- 23			Sand, very light brown, medium to coarse, mica-rich; gravel at 35 ft.....			27	- 37
Medium to fine sand; some inorganic silt; compact.....	23	- 29			Sand, very light brown, fine; clay at 38-39 ft., and 41 ft..			37	- 42
Fine sand; some inorganic silt; compact.....	29	- 33			Silt, gray, clayey.....			42	- 47
Coarse to fine sand; trace of inorganic silt; compact.....	33	- 38			Refusal, in silt or clay.....				at 47
Refusal.....		at 38			A5.				
25.					Sand, light brown, coarse; and gravel.....			0	- 17
Coarse to fine sand; trace of silt.....	0	- 9			Sand, light brown, coarse.....			17	- 27
Coarse to fine sand; trace of silt and fine gravel.....	9	- 17			Sand, brown, medium to coarse; capillary zone at approximately 37 ft.....			27	- 37
Coarse to fine sand; trace of silt; slightly cemented.....	17	- 23			Sand, brown, coarse, some fine to medium; water table at approximately 45 ft.....			37	- 47
Coarse to fine sand; trace of silt and fine gravel.....	23	- 36			Sand, brown, coarse, some medium.....			47	- 97
Coarse to fine sand; trace of silt.....	36	- 50			Sand, gray, medium, some coarse.			97	-107
Coarse to fine sand; trace of fine gravel and silt; micaceous	50	- 69			Sand, gray, fine.....			107	-117
Coarse to fine sand; trace of medium to fine gravel and silt.	69	- 73			Sand, gray, fine; and silt.....			117	-122
Coarse to fine sand; trace of silt.....	73	- 76			Refusal.....				at 122
=====			=====						
PHILLIPSTON									
Mass. Dept. Public Works Bridge Borings									
4.			13.						
Loamy sand, dry, loose, brown....	0	- 3.5			Sand; gravel; wood fill.....	0	- 11		
Medium sand, dry, brown.....	3.5	- 11.5			Coarse sand and gravel.....	11	- 18.5		
Medium sand; some gravel, dry, hard, brown.....	11.5	- 12.5			Sharp sand and gravel.....	18.5	- 30		
Bedrock.....	12.5	- 22.5			No refusal.				
=====			=====						
			21.						
			Loam, sand, and gravel fill.....			0	- 1.5		
			Fine sand.....			1.5	- 11.5		
			Soft, yellow sand and clay.....			11.5	- 27.5		
			Medium sand; gravel and little clay.....			27.5	- 31		
			Hard sand; gravel; little clay..			31	- 33.5		
			Ledge or boulders.....				at 33.5		

Table 5.--Logs of selected borings--Continued

Depth		Depth		Depth	
WINCHENDON (Continued)					
Mass. Dept. Public Works Bridge Borings					
2.		6.		18.	
Loose, coarse sand.....	0 - 4.5	Fill, brown, fine to coarse		Riprap and boulder fill.....	0 - 6.5
Hard, coarse sand and coarse		sand; little fine to medium		Firm, coarse sand and coarse	
gravel.....	4.5 - 10	gravel, medium dense.....	0 - 5	gravel.....	6.5 - 12.5
Hard, coarse sand and coarse		Brown, fine to coarse sand and		Hard, coarse sand and coarse	
gravel, very little clay.....	10 - 19	fine to coarse gravel; trace		gravel.....	12.5 - 16
No refusal.		of silt.....	5 - 10	Refusal.....	at 16
		Gray, fine to coarse sand and			
		fine to coarse gravel, (rock		20.	
		fragments), very dense.....	10 - 10.5	Loose, coarse sand; and	
		Refusal.....	at 10.5	coarse gravel.....	0 - 7.5
				Peaty sand.....	7.5 - 8.5
				Hard, compact sand.....	8.5 - 13
				Cemented sand and fine gravel,..	
				hardpan.....	13 - 16
5.		13.		29.	
Loam; sand; gravel; and		Riprap fill.....	0 - 5	Loose, dirty sand and gravel....	0 - 1.5
boulder fill.....	0 - 8	Sawdust fill.....	5 - 9.5	Hard sand; gravel; and mica.....	1.5 - 5
Coarse, yellow sand; gravel; and		Firm sand; gravel.....	9.5 - 12.5	Ledge or boulders.....	at 5
boulders.....	8 - 11	Cemented sand; gravel; little			
Sandy silt.....	11 - 15	clay, hardpan.....	12.5 - 16.5		
Coarse yellow sand; gravel; and		Refusal, rock or boulder.....	at 16.5		
boulders.....	15 - 21				
Medium, yellow sand.....	21 - 28.5				
Coarse, yellow sand and gravel...	28.5 - 35				
Coarse, yellow sand, gravel, and					
boulders.....	35 - 41				
Medium, yellow sand and gravel...	41 - 46.5				
Very compact sand; gravel;					
boulders.....	46.5 - 48				
Refusal.....	at 48				

Table 6.--Chemical analyses of water from selected wells
(Analytical results in parts per million except as indicated.)
(Analyses by Massachusetts Department of Public Health except as indicated.)

Well no.	Date	Temperature (°F)	Silica (SiO ₂)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Nitrate (NO ₃)	Nitrite (NO ₂)	Carbon dioxide (CO ₂)	Nitrogen			Dissolved solids (residue on evaporation at 180°C)	Hardness			Specific conductance (micromhos at 25°C)	pH	Color	Turbidity	ABS	Odor		
																	Ammonia (free)	Albuminoid	Ammonia (total)		Total	Carbonate	Noncarbonate							
1	12-4-46	-	-	0.60	-	-	-	-	-	-	-	52	9.0	0.900	-	0.880	0.120	-	-	199	1/64	-	-	-	6.6	38	30	-	-	
2-5	2-20-39	-	-	.37	-	-	-	-	-	-	-	1.6	15.0	.003	-	-	-	-	-	87	1/66	-	-	-	5.8	2	2	-	-	
6	11-1-39	47	-	2.6	-	-	-	-	-	-	-	9.2	.30	.001	-	.032	.042	-	-	75	1/27	-	-	-	5.9	5	0	-	1	
8	8-1-35	-	-	.10	.02	-	-	-	-	-	-	6.6	1.5	.000	-	.002	.026	-	-	-	1/31	-	-	-	5.8	0	0	-	0	
9	7-14-38	-	-	.03	-	-	-	-	-	-	-	7.6	2.8	.001	-	.000	.016	-	-	-	1/34	-	-	-	-	4	1	-	0	
13	8-3-50	-	-	.05	.00	-	-	-	-	-	-	-	.61	.000	-	.002	.008	-	-	-	10	-	-	-	6.0	3	1	-	0	
13	8-28-59	-	-	.28	.00	-	-	-	-	-	-	2.4	.05	.000	12	.016	.020	-	-	-	30	-	-	-	6.6	10	0	-	1E	
17	1-3-50	-	-	.05	.10	-	-	-	-	-	-	5.2	1.5	.000	-	-	-	-	-	-	34	-	-	-	6.1	2	2	-	0	
20	1-23-50	-	-	.9	-	-	-	-	-	-	-	26	3.95	.000	28	-	-	-	-	-	46	-	-	-	5.9	5	0	-	0	
2/41	2-64	43	4.8	.04	.03	20	2.6	4.0	4.9	58	12	5.6	9.0	-	-	.02	.000	-	-	96	-	61	13	155	-	7.3	4	0	-	-
3/46	-62	-	-	.1	.1	-	-	-	-	-	-	37	2.7	-	-	-	-	-	-	-	120	-	-	-	6.1	0	0	-	0	
54	8-27-59	-	-	.03	.0	-	-	-	-	-	-	5.4	1.3	.000	16	-	-	-	-	-	30	-	-	-	6.3	-	-	-	-	-
55	8-27-59	-	-	.03	.0	-	-	-	-	-	-	4.0	.50	.000	13	-	-	-	-	-	28	-	-	-	6.6	-	-	-	-	-
56	10-15-59	-	-	.12	.0	-	-	-	-	-	-	4.2	.25	.000	15	.012	.022	-	-	-	22	-	-	-	6.4	1	0	-	1E	
56	10-16-59	-	-	.04	-	-	-	-	-	-	-	3.0	.40	.000	15	-	-	-	-	-	26	-	-	-	6.4	2	0	-	2E	
56	10-19-59	-	-	.05	-	-	-	-	-	-	-	5.2	.75	.000	15	.008	.014	-	-	-	26	-	-	-	6.4	0	0	-	1E	
56	10-21-59	-	-	.05	.0	-	-	-	-	-	-	5.4	.40	.000	15	.008	.016	-	-	-	28	-	-	-	6.5	2	0	-	1E	
56	10-23-59	-	-	.08	.0	-	-	-	-	-	-	5.2	.60	.000	15	.014	.01	-	-	-	28	-	-	-	6.4	2	0	-	2E	
57	8-28-59	-	-	.03	.0	-	-	-	-	-	-	2.6	.05	.000	13	.008	.020	-	-	-	28	-	-	-	6.6	8	0	-	1E	
58	8-28-59	-	-	.05	.0	-	-	-	-	-	-	3.6	.35	.000	17	.008	.018	-	-	-	24	-	-	-	6.4	5	0	-	1E	
59	8-26-59	-	-	.20	.0	-	-	-	-	-	-	3.0	.05	.000	25	-	-	-	-	-	26	-	-	-	6.2	-	-	-	-	-
62	9-22-59	-	-	.08	.0	-	-	-	-	-	-	5.6	.75	.000	28	.010	.014	-	-	-	22	-	-	-	5.6	5	0	-	1E	
64	10-16-59	-	-	.06	-	-	-	-	-	-	-	5.4	1.0	.0	23	-	-	-	-	-	32	-	-	-	5.8	1	0	-	2M	
64	10-19-59	-	-	.04	-	-	-	-	-	-	-	6.8	.85	.0	24	.008	.30	-	-	-	32	-	-	-	5.8	0	0	-	1E	
64	10-21-59	-	-	.05	-	-	-	-	-	-	-	7.0	.50	.0	22	.006	.014	-	-	-	38	-	-	-	6.3	2	0	-	2E	
64	10-23-59	-	32	.02	.0	32	-	12	13	-	12	6.2	.70	.0	24	.006	.014	-	-	-	34	-	-	-	5.9	2	0	-	1E	
2/71	6-2-66	-	-	-	-	-	-	-	-	-	-	5.4	.4	-	-	-	-	-	-	-	-	-	-	197	-	7.4	12	Very turbid	-	-
ATHOL																														
ERVING																														
2	2-3-02	-	-	.05	-	-	-	-	-	-	-	1.6	1.7	-	-	-	.020	-	-	-	29	-	-	-	-	-	-	-	-	-
2	6-23-02	-	-	.10	-	-	-	-	-	-	-	17	4.6	.000	-	.018	.010	-	-	-	1/25	-	-	-	5.9	-	-	-	-	-
6	9-13-45	-	-	.09	-	-	-	-	-	-	-	1.8	.020	.000	-	.000	.018	-	-	-	1/22	-	-	-	-	0	0	-	-	-
8	9-24-34	-	-	.04	-	-	-	-	-	-	-	2.4	.04	.000	-	3.4	.160	-	-	-	-	-	-	-	6.7	24	-	-	-	-
9	7-21-36	-	-	.90	-	-	-	-	-	-	-	6.8	.20	.000	-	.000	.006	-	-	-	1/17	-	-	-	5.4	-	-	-	-	-
12	3-22-37	-	-	.05	-	-	-	-	-	-	-	6.8	1.2	.000	-	.002	.022	-	-	-	1/22	-	-	-	6.2	-	-	-	-	-
13	7-21-42	-	-	.20	-	-	-	-	-	-	-	17.39	10.43	.0	-	-	-	-	-	-	-	-	-	-	6.6	0	4	-	-	-
26	11-24-65	51	-	-	-	-	-	-	-	-	-	14.36	.155	.0	-	-	-	-	-	-	-	-	-	-	6.1	7	5	-	1	1
28	11-24-65	50	-	-	-	-	-	-	-	-	-	4.9	.42	.007	-	-	-	-	-	-	-	-	-	-	6.2	0	0	-	0	0
35	12-1-65	46	-	-	-	-	-	-	-	-	-	4.91	.443	.010	-	-	-	-	-	-	-	-	-	-	7.6	0	0	-	0	5G
38	11-24-65	50	-	-	-	-	-	-	-	-	-	4.5	-	.007	30	.018	.022	-	.022	-	18	-	-	-	6.45	10	0	0	-	1
39	11-18-65	52	-	0	-	-	-	-	-	-	-	7.6	.31	.0	-	-	-	-	-	-	-	-	-	-	6.75	10	4	-	1	1
39	1-10-66	50	-	-	-	-	-	-	-	-	-	4.9	0	.0	-	-	-	-	-	-	-	-	-	-	6.75	10	2	-	0	1
39	2-7-66	46	-	-	-	-	-	-	-	-	-	2	.2	.015	-	.15	-	-	-	-	-	-	-	-	5.5	180	7.5	-	-	-
4/41	10-19-65	-	-	1.7	.7	-	-	-	-	-	-	120.96	.222	.0	-	-	-	-	-	-	6	-	-	-	5.8	5	1	-	-	-
42	11-24-65	48	-	-	-	-	-	-	-	-	-	138.73	3.699	.016	-	-	-	-	-	-	-	-	-	-	6.3	10	5	-	1	1
43	11-24-65	50	-	-	-	-	-	-	-	-	-	49.52	1.152	.007	-	-	-	-	-	-	-	-	-	-	8.5	15	5	-	5G	5G
44	11-24-65	50	-	-	-	-	-	-	-	-	-	12.4	.443	.007	-	-	-	-	-	-	-	-	-	-	6.2	0	0	-	0	1
50	11-24-65	50	-	-	-	-	-	-	-	-	-	10.21	1.108	.0	-	.061	.074	-	-	-	-	-	-	-	6.6	0	0	-	0	1
55	11-24-65	63	-	-	-	-	-	-	-	-	-	4.5	0	.16	20	-	-	-	-	-	-	-	-	-	6.6	10	0	-	0	1
56	11-18-65	45	-	0	.33	-	-	-	-	-	-	2.3	0	.0	-	-	-	-	-	-	-	-	-	-	7.1	5	1	-	-	-
56	1-10-66	48	-	-	-	-	-	-	-	-	-	-	0	.0	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-

Table 6.--Chemical analyses of water from selected wells--Continued

Well no.	Date	Temperature (°F)	Silica (SiO ₂)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Nitrate (NO ₃)	Nitrite (NO ₂)	Carbon dioxide (CO ₂)	Nitrogen			Dissolved solids (residue on evaporation at 180°C)	Hardness			Specific conductance (micromhos at 25°C)	pH	Color	Turbidity	ABS	Odor				
																Ammonia (free)	Albuminoid	Ammonia (total)		Total	Carbonate	Noncarbonate										
GARDNER																																
5/27	1- 5-40	-	6.10	0.41	-	-	-	-	-	10.60	3.54	4.50	0.33	trace	-	0.04	0.03	-	-	-	13.7	-	-	6.1	0	0	-	-	0			
5/27	1- 6-40	-	5.70	.38	-	-	-	-	-	10.10	3.12	4.30	.36	trace	-	.06	.04	-	-	-	12.7	-	-	6.1	0	0	-	-	0			
NEW SALEM																																
2/ 3	6- 2-66	50	6.7	.03	.32	4.8	1.9	4.0	4.5	30	6.3	2.8	.3	-	-	-	-	-	48	-	20	0	71	6.9	4	-	-	-	-			
ORANGE																																
1	3-28-45	-	-	10.0	-	-	-	-	-	-	-	2.0	.35	trace	-	.012	.106	-	-	17/6	-	-	-	5.9	7	40	-	-	-			
1	7-27-45	-	-	.38	.01	-	-	-	-	-	-	2.0	.20	.000	-	.002	.012	-	-	28	-	-	-	5.9	2	1	-	-	-			
1	-62	-	-	.05	.00	-	-	-	-	-	-	6	.00	-	-	-	-	-	-	17/8	-	-	-	6.4	13	-	-	-	-			
2	6- 7-45	45	-	.2	.00	-	-	-	-	-	-	2.6	1.00	.000	6	.012	.018	-	-	25	-	-	-	6.3	2	<1	-	-	1E			
2	-62	-	-	.03	.00	-	-	-	-	-	-	7	.10	-	-	-	-	-	-	-	-	-	-	6.2	8	-	-	-	-			
6/42	12-15-50	-	11.3	.035	-	-	-	-	-	-	-	-	1.14	-	31	-	-	-	-	-	18	-	-	-	6.3	-	-	-	-	-		
2/42	1- 3-51	-	10.7	0	-	-	-	-	-	-	-	-	1.6	-	30	-	-	-	-	-	22	-	-	-	6.1	-	-	-	-	-		
6/42	1- 5-51	-	11.0	.015	-	-	-	-	-	-	-	-	2.3	-	38	-	-	-	-	-	36	-	-	-	6.05	-	-	-	-	-		
2/42	1- 8-51	-	-	-	-	-	-	-	-	-	-	-	2.3	-	40	-	-	-	-	-	38	-	-	-	5.95	-	-	-	-	-		
52	12-15-50	-	11.7	.02	-	-	-	-	-	-	-	-	2.35	-	28	-	-	-	-	-	38	-	-	-	6.1	-	-	-	-	-		
2/57	5-11-66	44	-	.01	.17	8.7	1.2	24	-	17	4.7	42	1.8	-	-	-	-	-	-	-	26	12	185	6.8	1	-	-	-	-	-		
7/57	5-11-66	49	-	.21	.27	5.3	1.1	14	-	35.5	13	4.0	.4	-	-	-	-	-	-	-	18	0	189	6.9	3	-	-	-	-	-		
2/59	5-11-66	51	-	.02	.27	5.3	1.1	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7/59	5-11-66	50	-	.36	.17	10	4.7	12	-	77	3.4	2.2	.1	-	-	-	-	-	-	-	44	0	107	7.3	26	-	-	-	-	-	-	
2/60	5-11-66	51	-	.57	.17	10	4.7	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7/60	5-11-66	-	-	.6	.42	30	6.1	192	13	54	-	325	3.6	-	-	-	-	-	-	-	100	56	1210	7.6	8	-	-	-	-	-	-	
2/61	6- 2-66	53	4.1	.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7/61	6- 2-66	53	-	.19	-	13	1.9	31	25	101	5.2	11	1.7	-	-	-	-	-	-	-	40	0	1260	7.5	-	-	-	-	-	-	-	-
2/64	7- 1-66	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7/64	7- 1-66	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2/67	8-12-66	-	-	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TEMPLETON																																
6/10	1- 9-64	-	-	3	-	7.1	1.1	-	-	-	7.7	30	.2	.2	-	.12	.08	-	-	-	22	0	101	6.6	0	high	0	0	-	-	-	
2/27	5-10-66	55	-	.00	.02	-	-	10	-	29	-	2.9	11	-	-	-	-	-	-	-	-	-	-	6.6	3	-	-	-	-	-	-	-
7/27	5-10-66	55	4.9	.1	2.4	14	7.0	18	21	67	13	40	1.5	-	-	-	-	-	245	-	64	9	278	6.8	90	-	-	-	-	-	-	-
2/28	6- 2-66	50	-	.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7/28	6- 1-66	50	-	.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-64	-	-	.92	.06	-	-	-	-	-	-	6.0	.13	-	-	-	-	-	-	89	-	-	-	6.4	18	-	-	-	-	-	-	-
42	12- 6-65	-	-	.60	.02	-	-	-	-	-	-	2.5	.1	.000	-	.01	-	-	-	16	-	-	-	6.3	20	30	-	-	-	-	-	0
42	1-14-66	-	-	.03	.02	-	-	-	-	-	-	5.0	.0	.000	-	.00	-	-	-	12	-	-	-	5.9	0	0	-	-	-	-	-	0
45	1-10-66	-	-	.25	.00	-	-	-	-	-	-	40	.1	.000	-	.08	-	-	-	22	-	-	-	5.8	17	0	-	-	-	-	-	0
45	1-11-66	-	-	.16	.02	-	-	-	-	-	-	106	.1	.000	-	.00	-	-	-	120	-	-	-	5.9	0	0	-	-	-	-	-	0
46	1-18-66	-	-	.09	.02	-	-	-	-	-	-	32	.5	.000	-	.00	-	-	-	32	-	-	-	5.6	8	0	-	-	-	-	-	0
54	-64	-	-	.02	.01	-	-	-	-	-	-	16.3	.06	-	-	-	-	-	-	25	-	-	-	6.7	5	-	-	-	-	-	-	-
WESTMINSTER																																
54	8-29-46	-	-	.05	.00	-	-	-	-	-	-	1.3	.12	.000	-	.000	.004	-	-	17/6	-	-	-	5.7	3	1	-	-	-	-	-	-
WINCHENDON																																
2/31	6- 2-66	48	5.5	.05	.06	5.6	1.9	15	13	44	7.4	4.4	.4	-	-	-	-	-	64	-	22	0	101	7.0	7	-	-	-	-	-	-	-
7/31	6- 2-66	48	-	.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86	-	-	-	-	-	-	-	-	-
2/32	6- 2-66	48.5	6.4	.00	2.0	8.0	2.4	8.9	11	59	5.8	6.8	.4	-	-	-	-	-	84	-	30	0	134	7.2	2	-	-	-	-	-	-	-
7/32	6- 2-66	48	-	>1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101	-	-	-	-	-	-	-	-	-

Table 6.--Chemical analyses of water from selected wells--Continued

Well no.	Date	Temperature (°F)	Silica (SiO ₂)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Nitrate (NO ₃)	Nitrite (NO ₂)	Carbon dioxide (CO ₂)	Nitrogen			Dissolved solids (residue on evaporation at 180°C)	Hardness			Specific conductance (micromhos at 25°C)	pH	Color	Turbidity	ABS	Odor
																Ammonia (free)	Albuminoid	Ammonia (total)		Total	Carbonate	Noncarbonate						
7	6-4-36	-	-	4.2	-	-	-	-	-	-	-	-	0.08	0.000	-	0.002	0.004	-	96	1/29	-	-	-	6.6	5	-	-	-
ATHOL																												
ERVING																												
6/3	-	-	-	6.0	-	-	-	-	-	-	-	4.8	.20	.003	-	.028	.008	-	113	1/53	-	-	-	6.7	30	40	-	-
19	11-18-65	50	-	.10	.16	-	-	-	-	-	-	10.5	.598	.0	20	.036	-	.041	154	66	-	-	-	7.5	10	2	0	1
8/	11-18-65	38	-	.63	0	-	-	-	-	-	-	9.8	.66	.049	20	.69	-	.73	86	22	-	-	-	6.8	60	35	.18	308
36	11-18-65	55	-	.13	0	-	-	-	-	-	-	3.0	.155	.007	25	.019	-	.12	40	14	-	-	-	6.5	5	2	0	1
37	11-24-65	52	-	-	-	-	-	-	-	-	-	36.67	1.373	.010	-	-	-	-	-	66	-	-	-	6.4	-	0	0	1
40	11-18-65	58	-	1.53	.050	-	-	-	-	-	-	8.3	.089	.007	20	.21	-	.195	134	-	-	-	-	7.5	50	33	0	1
40	1-10-66	56	-	-	-	-	-	-	-	-	-	9.8	0	0	-	-	-	-	-	-	-	-	-	7.4	50	36	0	1
40	2-7-66	62	-	-	-	-	-	-	-	-	-	7.6	0	0	-	-	-	-	-	-	-	-	-	7.4	35	15	0	1
45	11-24-65	58	-	-	-	-	-	-	-	-	-	15.88	3.633	.01	-	-	-	-	-	-	-	-	-	7.0	0	0	0	1
47	11-24-65	54	-	-	-	-	-	-	-	-	-	6.05	1.108	.007	-	-	-	-	-	-	-	-	-	7.7	0	2	0	1
48	11-18-65	45	-	.25	.16	-	-	-	-	-	-	9.0	.155	0	25	.018	-	.021	54	26	-	-	-	6.9	5	3	0	1
49	11-24-65	50	-	-	-	-	-	-	-	-	-	12.86	3.035	0	-	-	-	-	-	-	-	-	-	7.9	3	0	0	1
51	11-24-65	55	-	-	-	-	-	-	-	-	-	11.72	2.215	.007	-	-	-	-	-	-	-	-	-	6.3	5	1	0	1
52	11-24-65	52	-	-	-	-	-	-	-	-	-	14.74	2.281	.016	-	-	-	-	-	-	-	-	-	6.2	0	0	0	1
53	11-24-65	55	-	0	0	-	-	-	-	-	-	9.83	4.43	.026	130	.0912	-	.0966	164	40	-	-	-	6.4	0	0	0	1
54	11-24-65	51	-	0	0	-	-	-	-	-	-	7.56	1.82	.026	30	.101	-	.112	84	42	-	-	-	7.3	0	1	-	1

1/ Hardness as soap.

2/ Analysis by U.S. Geological Survey.

3/ Analysis by R. E. Chapman Co. and Thomas J. Rinaldo.

4/ Analysis by Motters Industrial Testing Laboratory.

5/ Analysis by Heywood-Wakefield Co.

6/ Analyst unknown.

7/ Field determination, U.S. Geological Survey.

8/ River sample taken at confluence of Millers and Connecticut Rivers and +0.7 mile from Erving 19.

Table 7.--Chemical analyses of precipitation at Hubbardston, Massachusetts

(Analytical results in parts per million except as indicated.)

(Analyses by U.S. Geological Survey.)

Date	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Nitrogen (as Ammonia, total)	Calcium, magnesium	Hardness as CaCO_3	Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Hydrogen ion (H^+)
11-65	1.0	0.14	0.2	2.6	0	0	5.20	0.50	0.70	0.00	-	-	-	28	4.80	0.02
12-65	.2	.10	.3	.1	0	0	3.30	.05	.00	.30	1	1	1	31	4.30	.05
1-66	.2	.02	.4	.0	0	0	1.15	.90	.40	.65	.5	.5	.5	19	4.65	.02
2-66	.0	.05	.3	.0	0	0	1.90	.85	.05	.00	0	0	0	22	4.50	.03
3-66	.6	.06	.4	.1	0	0	8.0	.70	.25	.40	2	2	2	39	4.20	.06
4-66	.4	.10	.3	.0	0	0	5.00	.70	.00	.30	2	2	2	42	4.15	.07
5-66	.7	.16	.4	.7	0	0	5.2	.90	.10	.45	2	2	2	44	4.25	.06
6-66	.8	.17	.3	.9	0	0	7.7	.75	.70	.65	2	2	2	66	4.10	.08

Table 8.--Major public water-supply systems

Community : furnishing: water	Population: (1960)	Estimated : population: served	Source of supply	Safe : yield : and/or : maximum : draft : (mgd)	Average : use ¹ / _l : (mgd)	Treatment ¹ / _l
Ashburnham :	2,758 :	2,900 :	Upper Naukeag Lake :	0.570 :	0.218 :	Hypochlorites; sodium fluoride.
Athol :	11,637 :	11,535 :	Reservoirs; gravel- packed well	2.200 :	1.049 :	Aeration; softener; sedimentation; gravity sand filters; pH adjustor; chlorine gas; fluoride adjustment; chlorine dioxide.
Gardner :	19,038 :	18,900 :	Crystal Lake; Pearly Brook	2.60 :	1.446 :	Chlorine gas.
Orange :	6,154 :	6,000 :	Spring; reservoir; two gravel-packed wells	.950 :	.479 :	Chlorine gas (surface only).
Templeton :	5,371 :	5,400 :	Two gravel-packed wells	.825 :	.390 :	Sodium silicofluoride.
Winchendon :	6,237 :	4,810 :	Upper Naukeag Lake; auxiliary wells	1.500 :	.391 :	Chlorine gas.
Totals :	51,195 :	49,545 :			3.973 :	

¹/ Source: U.S. Dept. of Health, Education and Welfare
Public Health Service, 1963 Inventory, Municipal Water Facilities, Region 1.

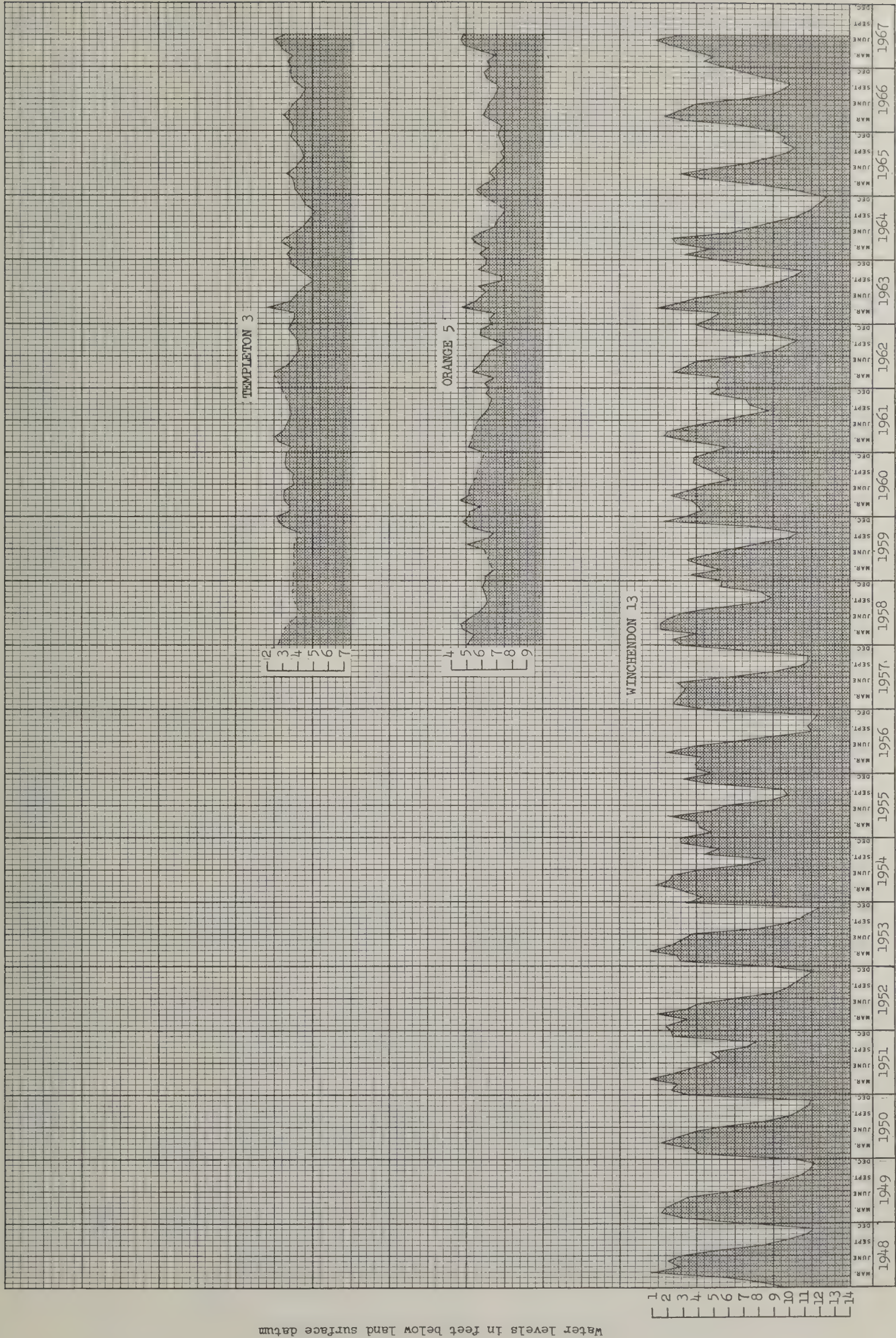


Figure 1.--Hydrographs based on monthly measurements of water levels in observation wells

Table 9.--List of available basic-data reports, ground-water series,
for Maine, Massachusetts, and New Hampshire^{1/}

MAINE

1. Southwestern Area, by Glenn C. Prescott, Jr., and Janet A. Drake, 1962, 35 p., 2 figs. Covers an area of about 800 square miles in York County.
2. Lower Penobscot basin, by Glenn C. Prescott, Jr., 1964, 40 p., 3 figs. Covers an area of about 825 square miles and includes parts of Hancock, Penobscot, and Waldo Counties.

MASSACHUSETTS

1. Wilmington-Reading Area, by John A. Baker and Edward A. Sammel, 1961, 50 p., 2 figs. Covers an area of about 43 square miles in the upper part of the Ipswich River basin in northeastern Massachusetts.
2. Lower Ipswich River basin, by Edward A. Sammel and John A. Baker, 1962, 47 p., 2 figs. Covers an area of about 110 square miles in northeastern Massachusetts.
3. Lowell Area, by John A. Baker and Richard G. Petersen, 1962, 28 p., 2 figs. Covers an area of about 115 square miles and includes most of the metropolitan area of the City of Lowell.
4. Parker and Rowley River basins, by Edward A. Sammel, 1962, 33 p., 2 figs. The rivers drain an area of about 77 square miles in northeastern Massachusetts.
5. Brockton-Pembroke Area, by Richard G. Petersen, 1962, 46 p., 2 figs. Covers an area of about 112 square miles in the northern part of Plymouth County.
6. Western Massachusetts, by Richard G. Petersen and Anthony Maevsky, 1962, 31 p., 1 fig. Covers an area of about 2,865 square miles and includes all of Berkshire, Franklin, Hampshire, and Hampden Counties.
7. Southeastern Massachusetts, by Anthony Maevsky and Janet A. Drake, 1963, 55 p., 2 figs. Covers an area of about 1,930 square miles and includes all of Barnstable, Bristol, Dukes, Nantucket, and Plymouth Counties (exclusive of the Brockton-Pembroke area).
8. Assabet River basin, by Samuel J. Pollock and William B. Fleck, 1964, 45 p., 1 pl. Covers an area of approximately 177 square miles and includes parts of Middlesex and Worcester Counties.
9. Housatonic River basin, by Ralph F. Norvitch and Mary E. S. Lamb, 1966, 40 p., 1 pl. Covers an area of about 530 square miles in the upper part of the basin, which is north of the Connecticut-Massachusetts State line.
10. Northern part, Ten Mile and Taunton River basins, by John R. Williams and Richard E. Willey, 1967, 56 p., 1 pl. Covers an area of about 195 square miles within Bristol, Norfolk, and Plymouth Counties.

Table 9.--List of available basic-data reports, ground-water series,
for Maine, Massachusetts, and New Hampshire--Continued

NEW HAMPSHIRE

1. Southeastern Area, by Edward Bradley and Richard G. Petersen, 1962, 53 p., 5 figs. Covers an area of about 390 square miles in parts of Rockingham and Strafford Counties.
2. Lower Merrimack River valley, by James M. Weigle and Richard Kranes, 1966, 44 p., 1 pl. Covers an area of about 396 square miles in central-southern New Hampshire.

1/ These reports are available, free of charge, at the U.S. Geological Survey, Room 2300, John Fitzgerald Kennedy Building, Boston, Massachusetts 02203.

EXPLANATION

- Well penetrated only unconsolidated deposits
- Well reached bedrock or refusal
- Well penetrated bedrock
- Boring penetrated only unconsolidated deposits
- Boring reached bedrock or refusal
- Auger boring reached bedrock or refusal
- Bridge boring reached bedrock or refusal
- Spring in unconsolidated deposits
- Boundary of the Millers River basin



Base from topographic quadrangles
U.S. Geological Survey



MAP OF THE MILLERS RIVER BASIN, MASSACHUSETTS SHOWING SITE OF HYDROLOGIC DATA

UNIVERSITY OF ILLINOIS-URBANA



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